

...nded in 1832

RAILWAY

LOCOMOTIVES AND CARS

UNIVERSITY
OF MICHIGAN

JUL 6 1953

TRANSPORTATION
LIBRARY

JULY 1953

FOR OFFICERS AND SUPERVISORS RESPONSIBLE FOR DESIGN, CONSTRUCTION AND MAINTENANCE OF MOTIVE POWER AND ROLLING STOCK

formerly
Mechanical and
Electrical Engineer

Hot Boxes
Reduced?

Wheel Shop
Marshall, Tex.

GE
Hp. Switcher

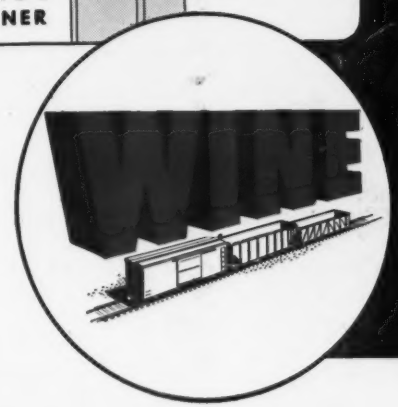
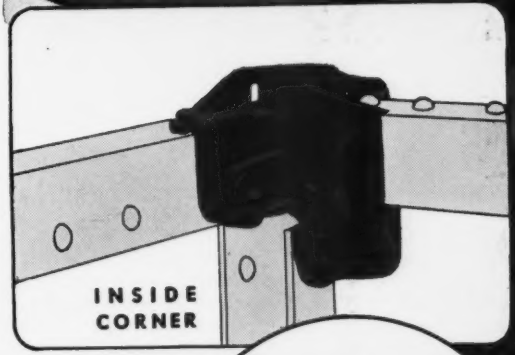
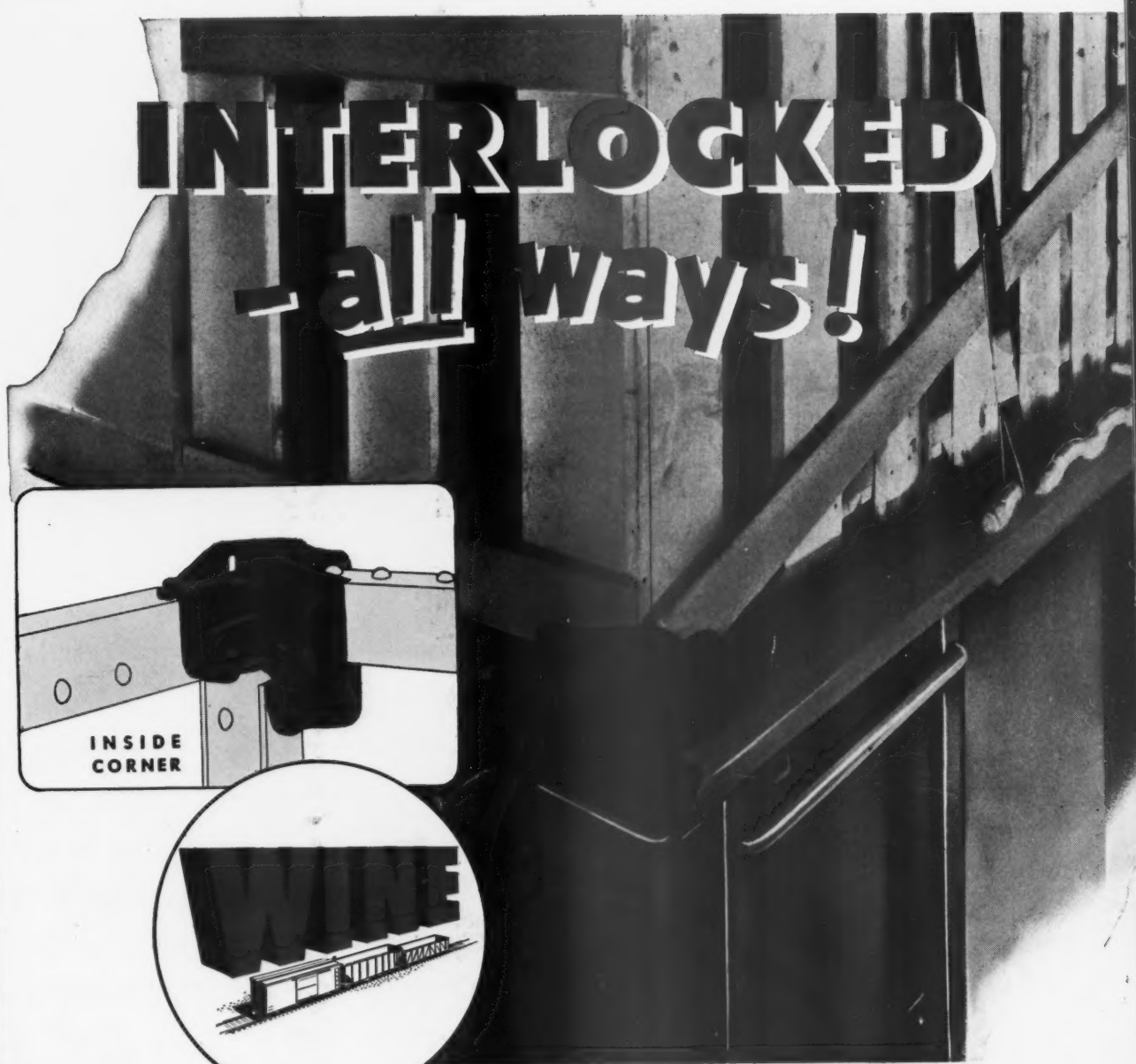
urnizing
nger Cars

ision Problems
opper Cars

ving Coil Ends
Commutator

'Em Rolling
• Locomotive
ation System

Devices



DROP END LOCKS

KEEP CORNERS FROM SPREADING • WON'T ACCIDENTLY OPEN

THE WINE RAILWAY APPLIANCE CO. TOLEDO 9, OHIO



WHEN YOU GET HOME TONIGHT . . .

meet the *SMARTEST* buyer in the world!

YES, we mean your wife — the girl who spends your hard-earned dough.

She's the smartest purchasing agent in the whole world. She doesn't need testing laboratories or technical consultants, because she knows that the fellows willing to risk a million bucks worth of advertising on the things she buys for your family, must have pretty good products to begin with. That's why she puts her faith—and your money—into nationally advertised merchandise.

BUFFALO UNIT and **BUFFALO TRUSLOCK** are two of the most widely advertised names in the railroad business. It's just our way of telling you that we at **BUFFALO** believe completely in what we have to sell the railroads.

TRUSLOCK

**UNIT
TRUCK**

2 PRODUCTS OF BUFFALO BRAKE BEAM CO.

July, 1953

VOLUME 127

No. 7

RAILWAY LOCOMOTIVES AND CARS

Founded in 1832 as the American Rail-Road Journal.

Simmons-Boardman Publishing Corporation:
James G. Lyne, President, New York; Samuel O. Dunn, Chairman Emeritus, Chicago; J. S. Crane, Vice-Pres. and Sec., New York; C. Miles Burpee, Vice-Pres., New York; John S. Vreeland, Vice-Pres., New York; H. H. Melville, Vice-Pres., Cleveland; C. W. Merriken, Vice-Pres., New York; John R. Thompson, Vice-Pres., Chicago; Wm. H. Schmidt, Jr., Vice-Pres., Chicago; Fred W. Smith, Vice-Pres., Chicago; Robert G. Lewis, Asst. to Pres., New York; Arthur J. McGinnis, Executive Vice-Pres. and Treasurer, New York; Ralph E. Westerman, Asst. Treas., Chicago.

C. B. Peck,
Editor, New York

H. C. Wilcox,
Managing Editor, New York

A. G. Oehler,
Electrical Editor, New York

E. L. Woodward,
Western Editor, Chicago

C. L. Combes,
Associate Editor, New York

G. J. Weihofen,
Associate Editor, Chicago

Lillian D. Milner,
Editorial Assistant, New York

C. W. Merriken, Jr.,
Business Manager, New York

Published monthly by Simmons-Boardman Publishing Corporation at 1309 Noble St., Philadelphia, Pa. Entered as second-class matter, January 16, 1953, at the Post Office at Philadelphia, Pa., under the act of March 3, 1879. Subscription price to railroad employees only in U. S., U. S. possessions and Canada, \$2 one year, \$3 two years, payable in advance and postage free. Subscription price to railroad employees elsewhere in the Western Hemisphere, \$5 one year, \$10 two years. All other countries: \$7 one year, \$14 two years. Single copies 50¢. Address correspondence concerning subscriptions to Robert G. Lewis, Assistant to President, 30 Church Street, New York 7.

Editorial and Executive Offices: 30 Church street, New York 7, and 79 W. Monroe street, Chicago 3. Branch offices: Terminal Tower, Cleveland 13; 1081 National Press bldg., Washington 4, D.C.; Terminal Sales bldg., Portland 5, Ore.; 1127 Wilshire blvd., Los Angeles 17, Cal.; 244 California St., San Francisco, Cal.; 2909 Maple avenue, Dallas 4, Tex.



Railway Locomotives and Cars is a member of the Associated Business Papers (A.B.P.) and the Audit Bureau of Circulation (A.B.C.) and is indexed by the Industrial Arts Index and also by the Engineering Index Service. Printed in U. S. A.

EDITORIALS:

The Electric Section Comes Through	40
Facts Needed for Sound Opinions	40
Is There a Permanent Solution?	42

NEW BOOKS	42
-----------------	----

FEATURE:

Can Hot-Boxes Be Reduced?	45
Alco-GE 800-Hp. Switcher	53
Corrosion Problems in Railway Equipment	54
T&P Wheel Shop at Marshall, Tex.	58
IC Passenger Cars Modernized at Burnside Shops	66
Rip Track Fire Fighting Wagon	68
Miscellaneous Diesel Shop Ideas	69

ELECTRICAL SECTION:

Removing Coil Ends from Commutator Risers	70
Quick Check for Car Cooling and Heating System	72
Milwaukee Rebuilds 37 Year Old Electrics	73
The Locomotive Excitation System	74
All-Service Electrics for Australia	77

QUESTIONS AND ANSWERS:

Schedule 24 RL Air Brokes	78
Diesel-Electric Locomotives	80

NEW DEVICES:

New Journal Stop Developed on the Frisco	82
Sun Glare Shields	82
Radius Grinding Fixture	84
Motor-Operated Rheostat	84
Electrical Cleaner	84
Water-Tube Boilers	84
Drive Pin Blind Rivets	84
Applying Semi-Fluid Air Filter Coatings	86
Magnetic Starters, Contactors and Relays	86
Bench-Type Mill	86
Rust Preventing Oil	88
Apex Running Boards Applied with Rivets	88
Ultrasonic Degreaser	88
Rectifiers for Electroplating	88
Lift Truck has Electric Transmission	108
Diesel Locomotive Jack	110
Lightweight Electric Drill	111
All Purpose Cleaning Spray	111

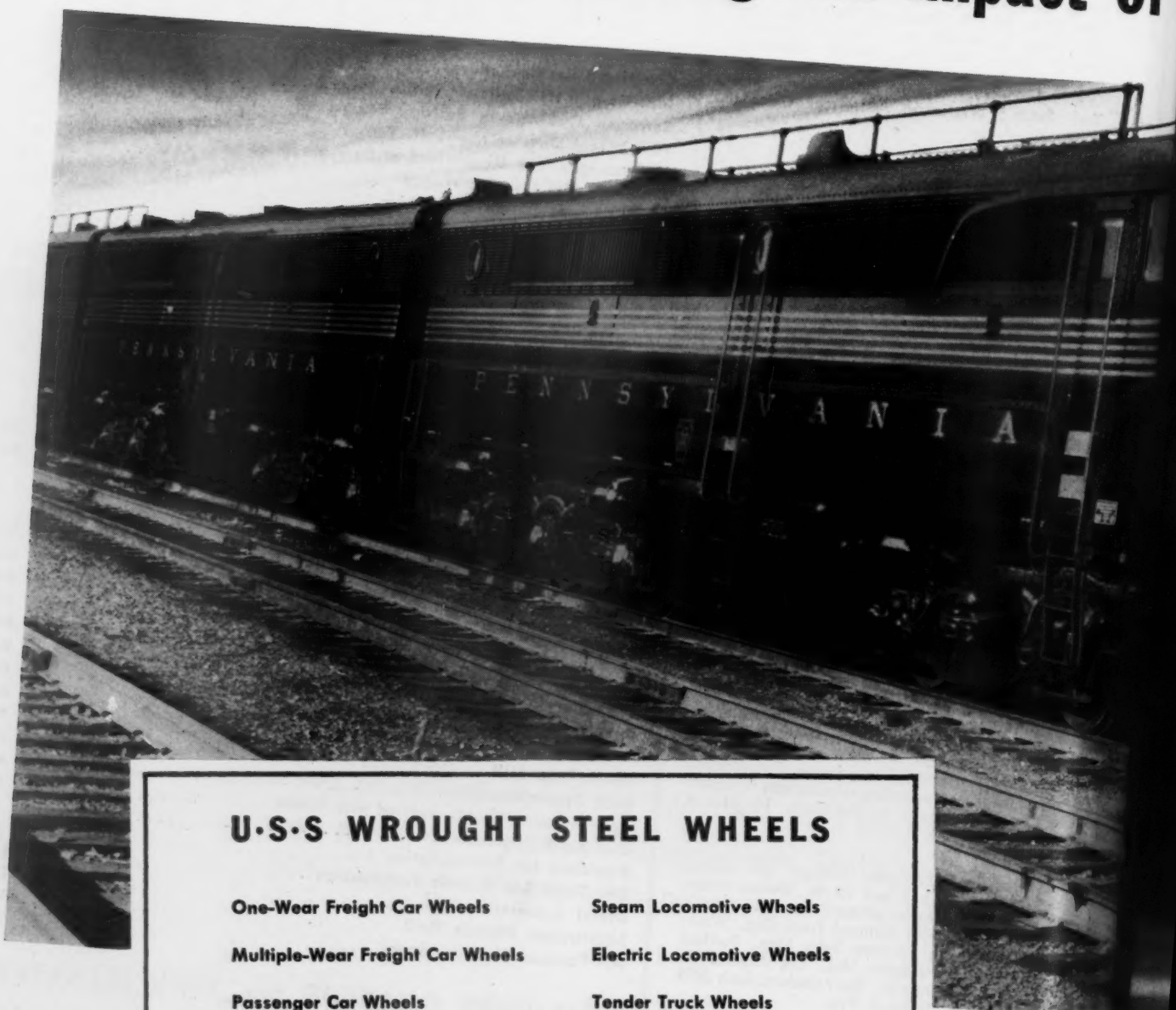
NEWS	90
------------	----

THE EDITOR'S DESK	38
-------------------------	----

INDEX TO ADVERTISERS	112
----------------------------	-----

PRINTED BY PERIODICAL PRESS CORP., PHILA. 23, PA.

Tough, Durable **U.S.S. WROUGHT STEEL** take severe braking and impact of



U.S.S. WROUGHT STEEL WHEELS

One-Wear Freight Car Wheels

Steam Locomotive Wheels

Multiple-Wear Freight Car Wheels

Electric Locomotive Wheels

Passenger Car Wheels

Tender Truck Wheels

Diesel Locomotive Wheels

Electric Transit Wheels

Crane Track Wheels

They wouldn't believe it either

— until they SAW it!

Seeing was believing for a group of mechanical officials from one of the mid-west's most important earth moving equipment builders.

Frankly they just wouldn't believe that the new 32" "AMERICAN" Pacemaker Lathe would effectively use 60 horse power and cemented carbide cutting tools in machining rough and tough alloy steel

forgings. So they came to see for themselves and they saw:

- 1 Cuts $1\frac{3}{8}$ " deep.
- 2 Cutting speed 300 feet per minute.
- 3 .030" feed.
- 4 60 horse power registered by horse power meter during the maximum cuts.
- 5 Not a shimmy or whimper from the machine.

They were amazed and convinced.

This new model Pacemaker is endowed with the power, stamina and convenience that combine to produce a thoroughly dependable and highly productive unit.

Bulletin No. 44 tells all . . . have one?

THE AMERICAN TOOL WORKS CO.

Cincinnati, Ohio U.S.A.

LATHES AND RADIAL DRILLS

A Mutual Problem—Who Will Move First?

For nearly three years the Class I railroads of the United States have had a program the present objective of which is to build up freight-car ownership to 1,850,000 cars by the end of 1954. When the Korean hostilities broke out, the Class I roads owned just under 1,728,000 freight cars. By January 1, 1951, the ownership had dropped to 1,718,000; a year later it had risen to 1,752,000, and on January 1, 1953, it stood at 1,757,000. This is a net increase of 29,000 cars in two and one half years, and leaves over 90,000 new cars to be accumulated, over and above retirements, in two years.

During the first five months of 1953 orders have been placed for a total of 10,700 freight cars and on June 1 the backlog of orders stood at about 57,300 cars. If orders continue at the current rate, the contract builders will soon be closing down some of their shops and reducing schedules in others in order to keep as much of their personnel as possible employed and available should the situation change for the better.

During the past 30 years the proportion of the new freight-car supply being built in the shops of the railroads and private car lines has increased from 11 per cent to 30 per cent. By narrowing the market within which the contract builders operate this trend is tending to reduce the number of contract shops available, thus lengthening delivery times when the roads are in the "feast" phase of the "feast-or-famine" cycle of freight-car buying. It also tends to

aggravate the plant idleness problem of the builders, and costs the railways money. No company can remain solvent long which does not recover in the price of its product the costs it incurs because of plant idleness and the destruction of an organization, which has to be rebuilt after a shutdown.

The problem of regularizing the placing of car orders belongs to the contract car builders. But it is also of importance to the railroad industry because it is costing the railroads money in the prices they have to pay when they buy cars. But the temporary interests of the individual railroads by no means always point in the same direction as the interest of the railroad industry as a whole.

Here, it would seem, is a field for exploration by the contract builders to determine whether it is not possible to find some practical inducements which will lead to alleviating at least the more violent fluctuations in the rate at which freight-car orders are placed. Another problem needing similar treatment is that of eliminating variations from standard specifications. Such variations occur more frequently than are justified by sound economics.

The smoothing out of the demand for freight cars and reducing the variations from standards of design are in the long range interests of the railroads as a whole, but they can only be attained by making them attractive to the individual roads in the short-range situations they have to meet.

C. B. Peck



1,204,305
FREIGHT
CAR MILES PER
HOT BOX SET-OFF

Texaco congratulates the Norfolk and Western on their outstanding Hot Box record for the year 1952.

FREIGHT CAR MILES PER HOT BOX SET-OFF		
N&W CARS	FOREIGN CARS	TOTAL
2,077,325	658,014	1,204,305


Good supervision and maintenance practices plus satisfactory materials including a premium car oil — *Texaco Car Oil 1960* — made this enviable record possible.

A Texaco representative will gladly give you full information. Just call the nearest Railway Sales Office in New York, Chicago, San Francisco, St. Paul, St. Louis or Atlanta, or write:

The Texas Company, *Railway Sales Department*, 135 East 42nd Street, New York 17, N. Y.



TEXACO Railroad Lubricants
AND SYSTEMATIC ENGINEERING SERVICE



IN ALL
48 STATES

EDITORIALS

The Electrical Section Comes Through

On September 15, 1952, the unified Electrical Section representing the Mechanical and Engineering Divisions, A.A.R., opened its first annual meeting. Then, barely out of its swaddling clothes insofar as organization was concerned, it was asked to hold its second annual meeting, not a year later in Chicago, but in June 1953 in Atlantic City, in conjunction with the annual meetings of the Mechanical and Purchases and Stores Divisions. Sixteen Electrical Section Committees reported and summaries of the reports and proceedings will be published in the August issue of *Railway Locomotives and Cars*.

There is nothing sketchy about these reports. In fact, it would appear that the committees had gone out to show what they could do when they were really put to it.

As examples, the Car Electrical Equipment Committee has reported fully on all of its eleven assignments and has included much new information. The unsung heroes who have been given the almost impossible task of standardizing wiring diagrams have made real progress. The

Committee on Wire, Cable and Insulating Material has turned in a 113-page report. Those assigned to work on repair shops have outlined small shop requirements in such detail that the report might discourage those who may have thought they wanted a shop. Actually, it is invaluable data to all who have or may need a small shop. A reader of the report on electrolysis can obtain a good understanding of cathodic protection and knowledge of its present status. Data on welding for diesel locomotives and metal spraying has been brought to a point where it is ready for insertion in the manual. The Automotive and Electric Rolling Stock Committee report brings the reader up to date on new developments and clarifies questions concerning the performance of a locomotive which perplex many operators.

And we could go on, but it seems sufficient to say that the Electrical Section met a challenge and demonstrated pretty thoroughly that its members can come up with the answers when they are called upon.

Facts Needed for Sound Opinions

A newspaper columnist recently brought to light an interesting trait of the human race—the tendency to arrive at and express an opinion without first having assembled and analyzed the facts necessary for arriving at that opinion. One of the examples used was the encouragement on the part of schools to have the students debate such political issues as what our policy should be toward China without the student having more than a rudimentary knowledge of the history, the economic life, the people or the rulers of that country, or the historic trade patterns between it and its neighbors. In such debates, the students can do little if any more than express “canned” opinions taken from the many sources of information available to them, some of which sources have no more background on the question for arriving at any decision than the students.

Now questions of foreign policy have nothing to do

with the everyday running of a railroad mechanical department. Yet the point made is an enlightening one that we should all reflect upon because it is a characteristic of all categories of people—students, politicians, industrial men and railroaders. How often are decisions reached without first determining carefully just what facts are needed to solve a problem, then assembling such facts and data, and finally analyzing it in the light of a broad background of the field concerned?

None of us would fail to see the fallacy of an obvious case of assuming that because one thing follows another, the first is the cause of the second. For example, a bridge may be painted a different color one day and collapse the next, but we would all realize immediately that the painting did not cause the bridge to fail, even though the failure followed the repainting.

But what about cases that are not so obvious? Is it

LAB TESTED

—continuing research assures high quality
... makes certain that Esso Railroad
Products keep pace with latest en-
gine design and developments.

PROVED ON THE RUN

—constant on-the-job checks by Esso Sales
Engineers assure the dependable per-
formance of all Esso Railroad Products.



Esso

ESSO ANDOK LUBRICANTS

A better lubricant for better protection, Esso Andok — gives 3-way service for important traction motor armature bearings: 1. Avoids overgreasing; 2. Avoids undergreasing; 3. Helps prevent introduction of dirt into bearings. Bearings lubricated with famous Andok Lubricant can be completely sealed after overhaul...should run under ordinary conditions for 400,000 miles *without further attention*. For any fuel or lubricating problem be sure TO CALL ON ESSO.

DEPENDABLE ESSO RAILROAD PRODUCTS

SOLD IN: Maine, N. H., Vt., Mass., R. I., Conn., N. Y., Penna., Del., Md., D. C., Va., W. Va., N. C., S. C., Tenn., Ark., La.

ESSO STANDARD OIL COMPANY — Boston, Mass. — New York, N. Y. — Elizabeth, N. J. — Philadelphia, Pa. — Baltimore, Md. — Richmond, Va. — Charleston, W. Va. — Charlotte, N. C. — Columbia, S. C. — Memphis, Tenn. — New Orleans, La.



not easy to condemn a new or complicated piece of equipment that we do not understand for a reason no better than the change in color of the bridge paint? Take, for example, the recent joke which indirectly ridiculed chlorophyll by stating that goats ate chlorophyll-laden grass all day and still stunk. At first thought this appears entirely logical. But carrying the example one step further—and it is only an example, not a defense of the value of chlorophyll—would it not make as much sense to say that a steam locomotive fireman who swallows coal

dust every day should never have a headache because that same coal dust is the raw material from which aspirin is made?

It is always easier to accept another's conclusion, or to arrive at our own by looking briefly at a few obvious facts, than it is to dig deep to make sure we have all the pertinent facts and then give them serious thought. It is a habit that all must guard against, especially those who are largely on their own and most of whose decisions are carried out either before or without review by another.

Is There a Permanent Solution?

Recurring epidemics of hot journal boxes on freight ears have been a familiar feature of railroading for at least 30 years—probably as long as there have been railroads. The pattern of all of these epidemics has been very much the same. The flare-up would occur either in the summer or winter, sometimes during both seasons.

During the last three or four years, however, the hot-box situation had advanced from the phase of sporadic epidemics to one of almost continuous acuteness. High journal loads and higher speeds, particularly higher rates of acceleration, starting with cold journals, which are associated with the diesel-electric locomotive, have greatly aggravated the problem. The situation became so bad that top executives became aware of it and began to take a personal interest in the measures taken to bring bearing failures under control.

Today the Mechanical Division is at work on several projects dealing with journal bearings, journal-box packing and lubricants for both plain and roller bearings. These measures all look ahead to improvements in journal boxes and their contents. A growing number of individual railroads are also taking measures to improve the attention which freight-car journal boxes receive in service. These look toward devoting enough time in terminal inspections and servicing so that freight trains are despatched with all journal boxes in good condition. This takes more labor, sometimes more time from the

operating department, than is customarily expended.

The evidence that such measures are fruitful is growing. It has come from sources involving at least five railroads. One of these is the Norfolk & Western. An article in this issue describing the results attained by a campaign involving some dozen measures adopted over a period of three years shows a remarkable reduction in the frequency of hot boxes and indicates that a campaign which has backing all the way to top management can be effective.

Such a campaign as that of the Norfolk & Western costs money for labor and for lubricants a part of the benefit of which accrues to other railroads. Whether it will be permanent depends on how long and how completely the management remains behind it. Once it loses its top support one may look forward to a gradual erosion by pressure from the operating department to get trains out of yards faster, and by budgetary pressure within the mechanical department. Even a relaxation of supervision because other problems become pressing will cause practices to slip back gradually toward the old level.

For this reason it seems that the only permanent control of the hot-box problem must come from a journal box of such character that it does not need attention beyond routine inspection except at long intervals. This is what the roller bearing offers. It is not beyond possibility that it may be attained with plain-bearing boxes.

NEW BOOKS

WORLD RAILWAYS. *Second edition. Edited by Henry Sampson. Available through Rand McNally & Co., P.O. Box 7600, Chicago 80. 648 pages; 12¾ in. by 8½ in. Bound in buckram. Price, \$25.*

Histories of various roads; detailed descriptions of locomotives, freight and passenger cars; routes and mileage of the principal systems; data on "name" trains; information on traffic control and signaling systems; tabular descriptions of representative steam, electric and diesel locomotives; typical gradient profiles, etc., are contained

in this encyclopedia survey of the operation and equipment of representative railroad systems in the United States and throughout the world. It is a companion book to Jane's Fighting Ships and Jane's All the World's Aircraft. Data are given on over 1,400 roads in 101 countries, and the text is illustrated with photographs, drawings, and maps totaling approximately 1,000. The book is divided into six geographical areas. The countries in each area are arranged alphabetically as are the individual railways in each country. There is a general index of railways.

Can Hot Boxes Be Reduced?

The Norfolk & Western has proved, to its own satisfaction, that the right approach to the problem, in all departments, will bring about satisfactory results.

BACK in 1949 the Norfolk and Western set about to prove that a substantial reduction in the number of hot boxes could and would be made. The manner in which this worth-while objective has been accomplished is outlined in this article and the railroad has demonstrated, to its own satisfaction, supported by accurate records, that the conventional type solid journal bearing has not become obsolete and that it is not necessary to replace it with some other type. The road has not only made a satisfactory reduction in the number of hot boxes on its own cars on its own lines but, by proper servicing in transportation yards, has secured a better performance on foreign cars on the N&W lines than is being obtained by the railroads as a whole.

During the past several years many panaceas have been brought forth to cure hot boxes. It was thought by some that the adoption of one or more of these corrective measures or improvements would permit a hot box improvement program to be forgotten. An example of this was the adoption of the present A.A.R. specification for car oil. The new specification was an improvement, but a better car oil alone will not solve the problem. The solution is not that simple; but rather a complex one.

The problem has also been aggravated by the reluctance of some member roads of the A.A.R. to use materials in accordance with the A.A.R. specifications and to adopt the practices recommended in the A.A.R. Lubrication Manual.

Genuine, consistent, top-management interest on the Norfolk and Western, sparked the drive that was made to produce a better hot box record. From early 1949 up to the present, there has been no let-up; in fact there has been a tightening up, necessary further to improve the record each year. The management interest has not been confined alone to the mechanical department, it extends into the operating department and even higher. Each morning the president and the vice-president and general manager get the official score for the preceeding day.

The thought has been advanced in some circles that the improvement the Norfolk and Western has made in its hot box record was due partly, at least, to the oper-

ating conditions peculiar to that road; that it was, relatively, a road of low operating speeds. While it is true that some of the operation is at low speeds due to mountainous regions, there are a number of districts that are practically level and on these districts speeds comparable with high-speed railroads are maintained. In the movement of coal eastward from the fields to the Atlantic Seaboard, three mountain ranges are encountered in the first half of the total distance. The second half of the total distance is more or less rolling terrain where maximum speeds of 60 m.p.h. are readily maintained. Manifest trains have tonnage filled out with loads of coal.

In the movement of coal westward from the fields to the Great Lakes mountainous grades are not encountered. Trains consisting entirely of loads having a total weight of 15,000 to 16,000 tons, are handled over districts of more than one hundred miles without stops, at average speeds of 35 m.p.h.

The average miles per serviceable freight car per day on the N&W, as compared with that on all Class I railroads, since 1949, is as follows:

Year	N&W	Class I
1949.....	36.2	42.9
1950.....	48.7	46.5
1951.....	53.0	47.2
1952.....	Not available	Not available

It will be noted that in the years 1950 and 1951, the mileage was higher for freight cars on the N&W lines than it was for all Class I railroads.

The N&W has a larger percentage of home-owned cars on its lines than the percentage for all Class I railroads, as shown in the following table:

	Percentage of N&W cars to total cars on line	Percentage of home-owned cars to total cars on line of Class I railroads
1949.....	86.0	50.8
1950.....	79.3	41.6
1951.....	78.0	38.2
1952.....	82.0	43.5

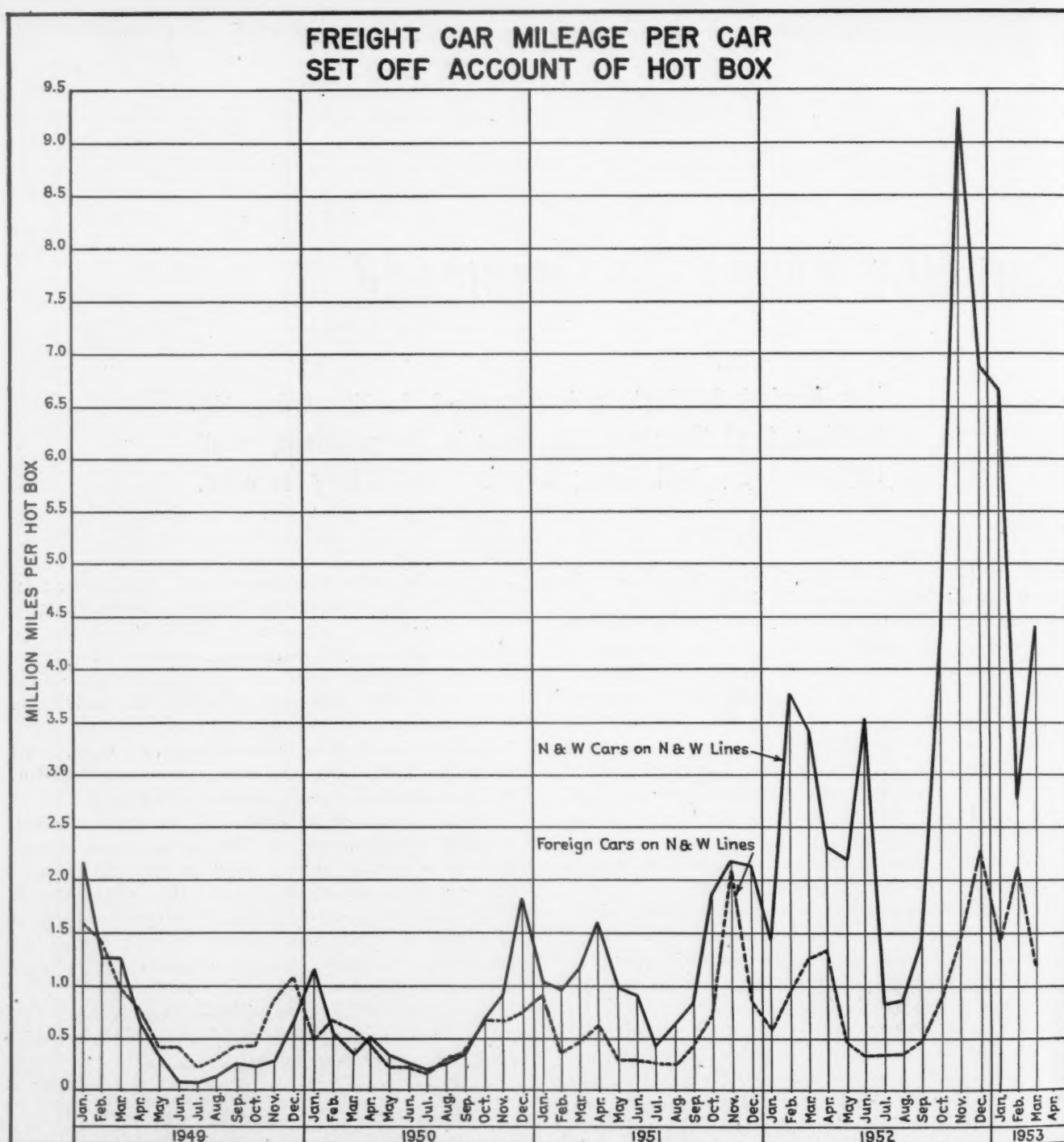


Fig. 1—A comparison of the mileages per car set off on account of hot boxes for N&W and foreign N&W lines

In order to increase the average freight train speeds, a program was inaugurated in the early part of 1952 to equip locomotives; especially those handling manifest trains and long coal trains, with auxiliary tenders. The increased average speed of these trains due to the elimination of water stops, has not resulted in any upward trend in the number of hot boxes. It has been the experience of the N&W that when trains have gotten under way and the journal boxes become warm, hot boxes can be reduced by keeping the train moving rather than stopping for inspection or for other reasons. For example, on the Kenova District, a distance of 112 miles, it was

formerly necessary to make one stop for water. Since eliminating this water stop by the use of an auxiliary tender, a higher average speed has been maintained with a reduction in the number of hot boxes. The operation of trains over a long district of several hundred miles should contribute to a reduction in the number of hot boxes.

In the overall picture the operation on the N&W, as far as it has any effect on hot boxes, does not differ greatly from that of Class I railroads as a whole.

The improvement and the factors responsible therefore, which the Norfolk and Western, has made in its

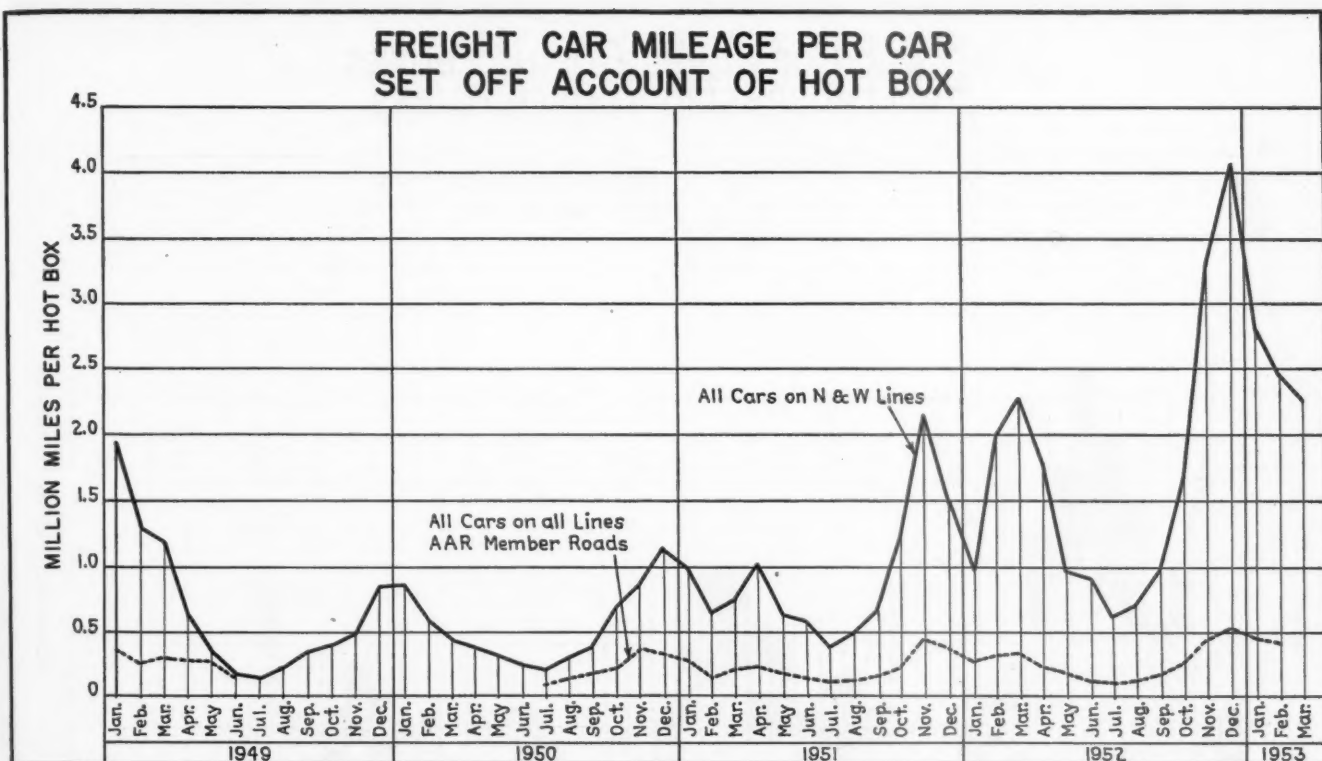


Fig. 2—Mileages of all cars set off on N&W lines as compared with all cars set off on all lines of member roads

hot box record since the year 1949, is best shown in the Figs. 1 and 2.

"Figs. 1 and 2 show how the program started in 1949 began to produce results in 1950; especially in the summer months and how the improvement has grown from year to year. These also show how improvements have been made each successive year during the summer months. The record for foreign cars on the N&W lines, as shown on Fig. 1, is much better than the record for the country as a whole shown on Fig. 2." The better record for foreign cars on Norfolk and Western lines than for the country, as a whole, is due largely to the special attention given to foreign cars on the Norfolk and Western system. This special attention often consists of both inbound and outbound inspection at terminals, setting up of the packing and free oiling. Fig. 3, giving annual figures, shows that for the year 1952 the miles per hot box on the Norfolk and Western cars on its own lines, increased 300 per cent over the year of 1949.

Fig. 4 which shows the relation of number of hot boxes to atmospheric temperatures, portrays more clearly the trend in the reduction of hot boxes, than first curve in Fig. 1.

Fig. 5 shows, in chronological order, various factors which have contributed to a reduction in hot boxes on the Norfolk and Western system. At the bottom of this graph, the reduction in the number of hot boxes can be readily followed in relation to the time the various factors were put into effect.

In 1949 it was decided that the first step in a hot box improvement program would be to determine the physical characteristics of a car oil that would give the best performance in day to day operation and afford maxi-

mum protection in borderline lubrication. It was thought this information could be better secured through road tests, rather than in the laboratory.

Two 70-ton hopper cars, loaded with coal to the maxi-

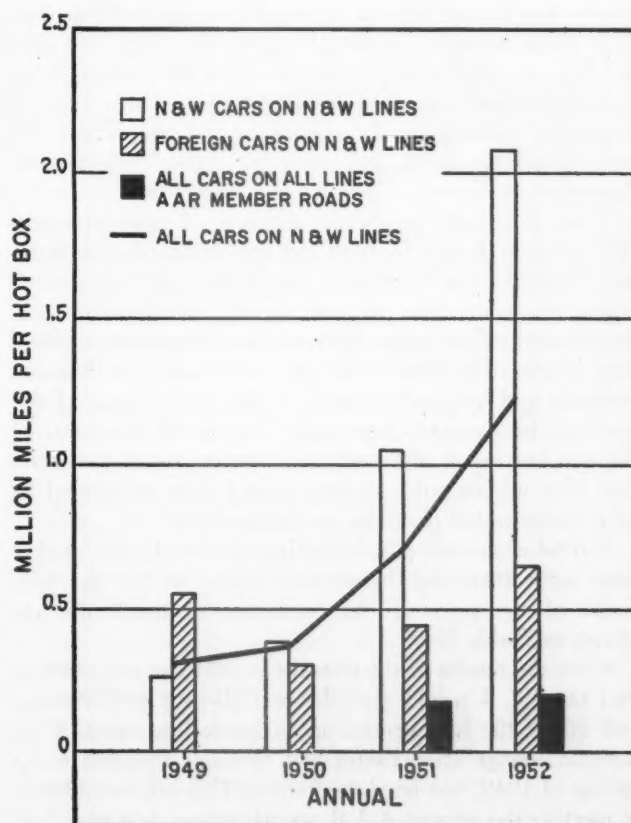


Fig. 3—Comparison of mileages per hot box on an annual basis

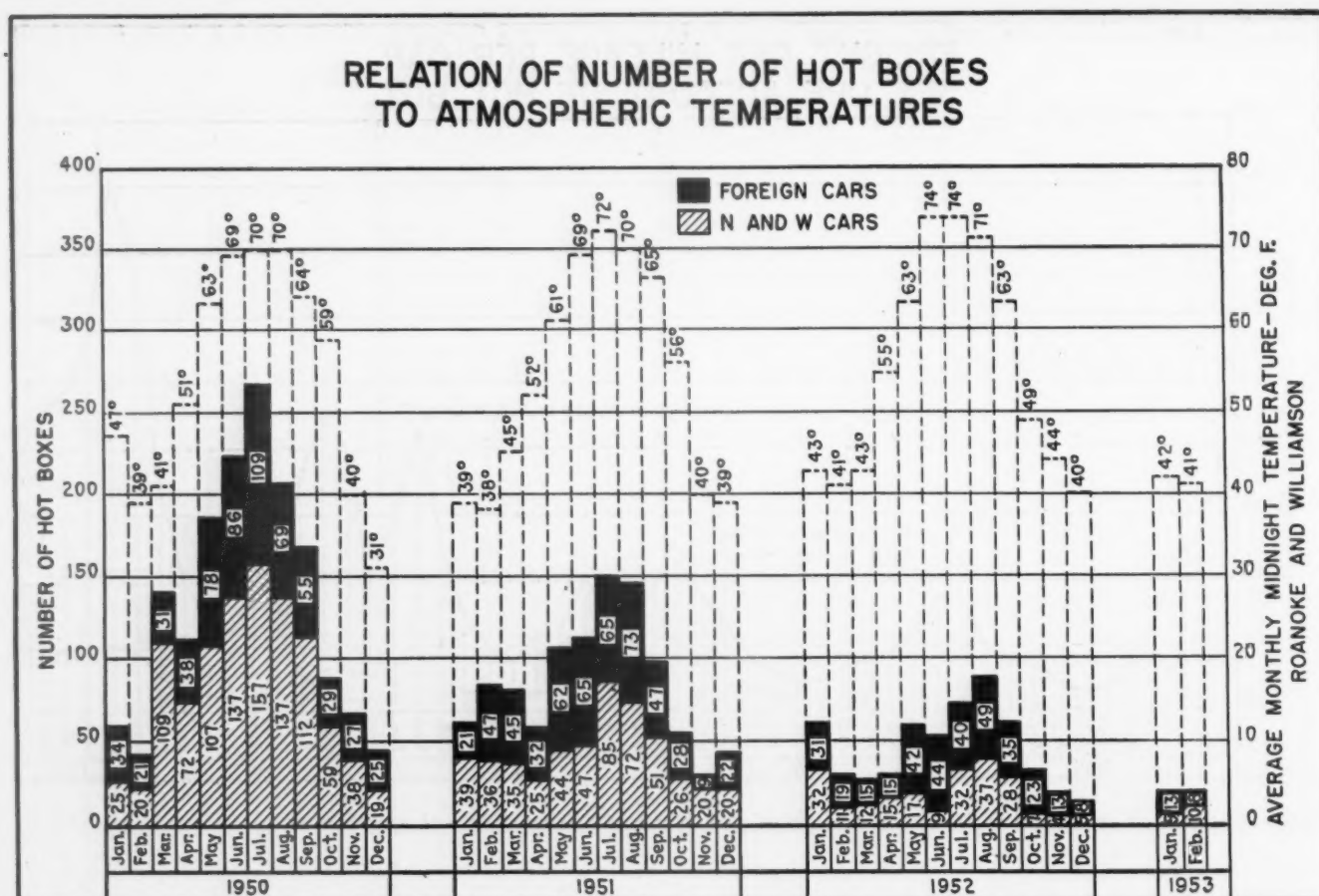


Fig. 4—The relation of atmospheric temperature to the number of hot boxes

mum journal load were used for these tests. A thermocouple was placed in each of the sixteen journal bearings at a point midway the length of the bearing back and as close as practicable to the lining of the bearing. An instrument car was used between the two test cars to house the instruments for recording the temperature of each bearing, speed and securing other information desired.

Tests runs were made on districts of approximately 100 miles in length in both flat and mountainous territory. The tests were made in manifest trains and special trains to secure the desired speeds, acceleration and deceleration. Conditions were set up to produce borderline lubrication. New bearings were used on full-size journals and on journals worn to the limit. Some of the bearings had various percentages, up to 66 per cent, of the bearing metal removed from the length of the bearing. Flat wedges and wedges cocked were employed to give concentrated loadings on the bearings.

A total of six car oils, including the one in use at that time were furnished by several refineries for the test. Some of the physical characteristics of these oils are shown on Table 1.

From the results of the tests the conclusion was reached that Oil No. 4 would give the best all-year performance and afford the best protection in borderline cases. With a slight change (See Factor 10) this oil, adopted in the spring of 1949, has been used since. This oil, in addition to meeting the present A.A.R. specifications, is a premium oil and contains the following additives: (1) Load carry-

TABLE I—CHARACTERISTICS OF CAR OILS TESTED—1949

Car oil number	1	2	3	4	5	6
Flash point, F.	410	385	360	390	400	420
Viscosity at 210 deg. 45	52.5	49	49	54.8	45.8	46.9
Viscosity index.	75	88	71	99	91	105
Pour point.	-20	-25	-20	-35	-40	-40
Saponification No. . . .	1.0	0.35	0.25	2.0	5.1	5.3
Neutralization No. . . .	0.076	0.097	0.078	0.187	0.50	0.52
Carbon residue.	0.23	1.83	0.15	0.24	0.078	0.21
Additives.	Yes	No	No	Yes	Yes	Yes

Note: Oil No. 2 in use prior to adoption of Oil No. 4.

TABLE II—FREIGHT CAR AXLES FAILING IN SERVICE

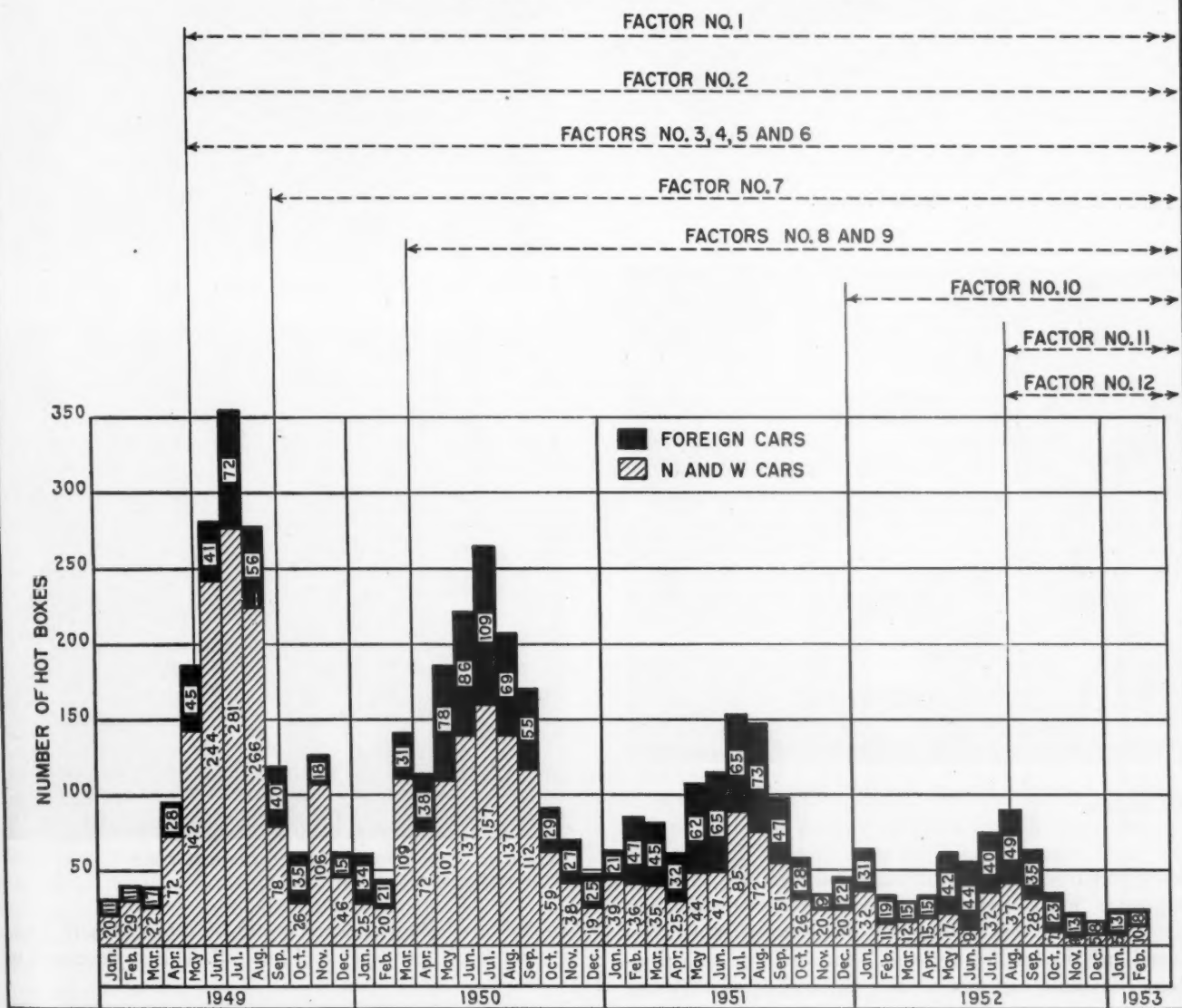
Year	No. of axles failed			No. of hot breaks	No. of cold breaks	Trains	
	N&W	Foreign	Total			Time	Extra
1944.	4	—	4	4	3	1	3
1945.	1	1	2	2	2	2	—
1946.	4	—	4	3	—	4	5
1947.	7	2	9	8	1	6	9
1948.	13	2	15	15	3	6	5
1949.	5	1	6	6	5	1	5
1950.	12	4	16	16	14	6	10
1951.	6	3	9	9	8	4	5
1952.	5	3	8	8	8	3	5
Total.	57	18	75	71	66	28	47

ing and oiliness; (2) Pour-point depressant and viscosity improver and (3) Anti foam.

The results of the original tests have been verified by subsequent tests.

An all-cotton journal box packing waste has been used for a number of years. The waste conforms to A.A.R. specifications and, in addition, has to conform in grade and quality to master samples showing acceptable threads, which must be inspected and accepted by the manufacturer at the time the contract is placed. In addition to close inspection of new waste when it is

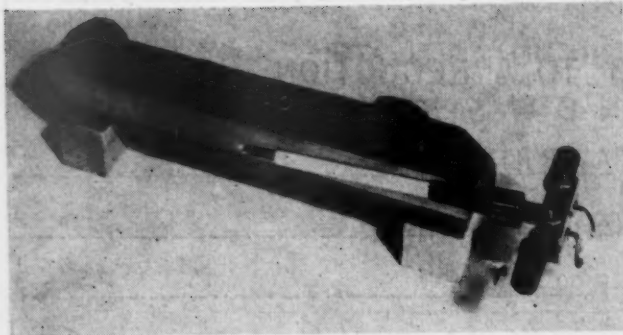
FACTORS CONTRIBUTING TO A REDUCTION OF HOT BOXES ON N & W SYSTEM



- Starting May 21, 1949, and continuing for one year, all packing removed was destroyed. This packing contained Texaco No. 748 oil. A majority of N&W cars were repacked within a six months' period. All boxes were repacked with new packing containing Texaco No. 1499 oil which had a viscosity of 50-55 sec. at 210 deg. F. This oil had the following additives: load carrying, pour-point depressant, viscosity improver, anti-foam agent and oiliness agent.
- Beginning May 21, 1949, packing removed from foreign cars is destroyed rather than reclaimed.
- Starting May 21, 1949, substantial changes made in reclamation to provide improved waste blending, saturation, and oil refining.
- Improvement in wheel-shop equipment and practices was begun May 21, 1949.
- A more thorough inspection of journal boxes at box-packing periods was started May 21, 1949.
- Starting May 21, 1949, more effective policing of the servicing of journal boxes in transportation yards was adopted.

- Beginning September 15, 1949, packing retainers were applied to journal boxes of all N&W cars within a six months' period.
- On April 1, 1950, the use of reclaimed packing mixed with 50 per cent new oil was begun.
- A 12-months' repacking program for N&W cars was adopted April 1, 1950. (A. A. R. Interchange Rule 66 now requires repacking at intervals of 15 months.)
- The car oil was changed from Texaco No. 1499 to Texaco No. 1960 beginning January 1, 1952. The No. 1960 oil is the same as the No. 1499 oil with the exception that the viscosity is 53-55 sec. at 210 deg. F.
- The repacking of journal boxes on N&W cars that had been repacked on foreign lines regardless of packing date was started August 8, 1952.
- Uniform rolls of journal-box packing prepared at packing storage vats by employees especially assigned to this work commenced August 8, 1952.

Fig. 4—Factors which contribute to a reduction of hot boxes on the Norfolk & Western



Location of thermocouple in journal bearing.



Location of connection between lead from potentiometer and thermocouple.

being prepared at the manufacturer's plant, the railway's inspectors make occasional visits to the reclamation plant to insure the new waste being satisfactorily received and the quality uniform. Samples from each shipment of waste are sent to the physical laboratory for inspection and thread length count. Lots that do not meet specifications are handled with the manufacturers.

Journal bearings are purchased to A.A.R. specifications and, in addition, are required to have a bond strength of not less than 7,000 lb. per sq. in. between the lining metal and the bronze back. The majority of the bearings have bond strength considerably in excess of the minimum requirement. No relined bearings are used.

Interchange rules provide that journal bearing wedges shall be renewed if flat on top lengthwise for a distance exceeding original diameter of journal; or where over-all length measured at contact surfaces is reduced more than $\frac{3}{16}$ in. Wedges on N&W equipment are renewed if worn flat lengthwise for a distance of one inch less than the original diameter of the journal; or, where over-all length measured at contact surfaces is reduced $\frac{3}{16}$ in. or more.

Having determined the characteristics of an oil that would give the best performance and having decided what improvements on waste and bearings that should be made over and above that provided for in A.A.R. specifications, it was then decided that the packing in the boxes of all



Location of thermocouple leads on truck.



Connection of thermocouple leads between test and dynamometer cars.

Norfolk and Western cars would be replaced with packing made of new waste and new oil. This replacement of

TABLE III—JOURNAL BOXES REPACKED ON N&W CARS BY FOREIGN ROADS— ALSO FOREIGN CARS REPACKED ON N&W

	N&W cars repacked on foreign roads			Foreign cars repacked on N&W System	Accumulated total
	Box cars	Others	Total	Accumulated total	
1951					
January.....	440	453	893	893	672
February.....	509	225	734	1,627	704
March.....	482	157	639	2,266	960
April.....	582	143	725	2,991	672
May.....	459	116	575	3,566	711
June.....	427	100	527	4,093	681
July.....	339	89	428	4,521	640
August.....	271	95	366	4,887	869
September.....	240	136	376	5,263	765
October.....	303	206	509	5,772	822
November.....	262	243	505	6,277	937
December.....	260	241	501	6,778	702
Total.....	4,574	2,204	6,778	6,778	9,135
1952					
January.....	282	320	602	602	650
February.....	254	285	539	1,141	650
March.....	325	351	676	1,817	910
April.....	300	298	598	2,415	858
May.....	307	254	561	2,976	1,062
June.....	329	283	612	3,588	753
July.....	239	134	373	3,961	579
August.....	187	198	385	4,346	431
September.....	144	178	322	4,668	364
October.....	155	170	325	4,993	430
November.....	237	220	457	5,450	383
December.....	173	279	452	5,902	449
Total.....	2,932	2,970	5,902	5,902	7,519



Detail of connection of thermocouple leads between test and dynamometer cars.

packing was started in May 1949, and completed within one year. A majority of the cars had the packing replaced within a six-month period. The old packing removed was destroyed. (Factor No. 1, Fig. 5.)

To avoid contamination during reclamation, a policy was adopted at the same time of destroying, at box packing periods, all packing removed from foreign cars and from Norfolk and Western cars that had been repacked on foreign lines. It was felt such a policy was necessary in order to maintain the quality of the reclaimed oil equal to that of the new oil and to insure the retention of the proper amounts of the several additives which the new oil contained. (Factor No. 2, Fig. 5.)

After various experiments, the method of reclaiming oil by mechanical centrifuging was discontinued and a method of stripping and filtering by a RefinOil process was adopted. The RefinOil process, in addition to reclaiming the oil to meet the A.A.R. specifications of precipitation, also brings the oil well within the A.A.R. limits of all other specified physical characteristics.

The N&W method of reclaiming also restores the packing to a condition well within the A.A.R. specifications for moisture and cleanliness. The short ends are reduced to a minimum. The new waste is handled as carefully as possible, to prevent unusual shock or tear, for the reason that the least amount the new dry waste is disturbed, the less will be the creation of short ends and lint.

The blending of the new and reclaimed waste is accomplished by putting both into a slow rotating smooth cylinder that conveys the mixture into a hot oil vat for saturating. From the hot oil vat, the packing is placed in drums for shipment to outlying points. The pulling apart of the new waste and the placing of it into the blending cylinder is the only time it is handled by hand until it is made into rolls for insertion into the journal boxes. The recovery of the used waste from old packing

removed from journal boxes of Norfolk and Western cars is about half of the total packing applied. The mixture, therefore, of the reclaimed packing is approximately 50 per cent new waste and 50 per cent reclaimed packing. (See Factor No. 8, Fig. 5) The reason for only approximately 50 per cent recovery of used waste is due to the destroying of all packing removed from foreign cars and Norfolk and Western cars packed on foreign lines, and to the discarding of short ends in the reclamation plant. (Factor No. 3, Fig. 5)

In order to improve the quality of the finish of journals, new axle lathes and journal truing lathes were ordered to replace obsolete machines in both of the Norfolk and Western's wheel shops. A number of the new machines are in service and the program should be completed by the end of 1953. To secure journals of the proper finish before the new machines could be received and installed, the practice was adopted, where necessary, of burnishing the journals with a double, instead of a single rolling of the surface. (Factor No. 4, Fig. 5)

In 1949, it was also decided that a better and more thorough inspection and repacking of journal boxes at the 12 months box packing period could be done if adequate and more uniform tools were provided for performing the necessary work. This practice was supplemented by assigning at the major points, a group of workmen with direct adequate supervision to do the work provided for in A.A.R. Rule 66. Prior to this method of performing the work, men were used quite frequently who had little experience as to how it should be done.

As a further means of helping the men servicing journal boxes to properly perform their work, electric lanterns, which may be worn on the hat or belt are furnished all men on the second and third tricks. These lanterns enable the men to use both hands in performing the work, and both hands are needed in setting up the packing. The



Instruments used in dynamometer car for recording temperatures.

electric lanterns give much better illumination than the oil lanterns previously used. (Factor No. 5, Fig. 5)

At the same time, supervision in the larger transportation yards was improved by the assignment of supervisors who devoted their entire time to following the inspection and servicing of journal boxes. Prior to this time, the supervision consisted, primarily, of assigning various crews to this work at the beginning of the shift. The balance of the time, the supervisors were busy handling phone calls from the office in regard to the train in sight, furnishing information as to the time certain tracks would be ready for inspection, when the work would be completed, etc. In other words, there was not much direct supervision of the servicing of journal boxes in the transportation yards. This phase of the work is now handled with yard telephones and other yard communicating systems, which enables the supervisors to stay with their men. This places the responsibility more directly on the supervisors to pass judgment on unusual conditions detected by the workmen.

It is the opinion of the N&W management that too much emphasis cannot be placed upon the necessity of providing the right kind and the proper amount of supervision in the transportation yards. This is a kind of supervision that is often hard to get going and is often met with considerable opposition. When it is once secured, it will be found to be well worthwhile. (Factor No. 6, Fig. 5)

Starting in 1949, waste retainers were applied to the journal boxes of all Norfolk and Western freight cars within a period of six months. The use of waste retainers has reduced the number of hot boxes caused by waste grabs. Some trouble was experienced at first of the retainer fouling the journal; particularly in the bolted type journal boxes. Improvements in the retainers has not only

practically eliminated the fouling of the journal by the retainer, but has also afforded greater protection against waste grabs. The use of retainers has greatly reduced the servicing of journal boxes in transportation yards. (Factor No. 7, Fig. 5)

In April 1950, a further step in the improvement program was the adoption of a 12-month repacking period for all N&W freight cars. The 12-month, rather than the 15-month repacking period gives opportunity for a more frequent and thorough inspection of the journal boxes, bearings and wedges, than can be made at the regular inspection periods. It often permits the replacement of parts before they have reached a condition where they would cause a hot box. The 12-month repacking period also prevents excessive contamination of the car journal oil. It has been the experience, on the N&W, that many cases, conditions, which would eventually lead to the development of a hot box are corrected with the 12-month repacking period. The difference in cost of a 12-month and 15-month is more than justified. The A.A.R. changed from a 15-month to a 12-month inspection period on January 1, 1951, but went back to the 15-month period on August 1, 1952. It is thought that the 12-month schedule did not produce as good results on a majority of the roads as it did on the N&W, for the reason that a complete improvement program had not been adopted by those roads. The Norfolk and Western has continued to use the 12-month period. (Factor No. 9, Fig. 5)

As a further step in the effort to reduce hot boxes, a policy was adopted in August 1952, of repacking all journal boxes on Norfolk and Western cars that had been repacked on foreign lines, regardless of packing date. In other words, N&W cars packed on foreign lines were considered out-of-date for repacking when they reached their lines. This step was prompted by the number of hot boxes occurring on N&W cars on N&W lines that had been repacked on foreign lines. For example, in 1952, 22 per cent of the hot boxes on N&W cars on N&W lines occurred on cars that were repacked on foreign lines. During this period 7 per cent of the Norfolk and Western cars were repacked on foreign lines. (Factor No. 11, Fig. 5)

In August 1952, the N&W started the making of packing rolls at the packing storage vats, rather than having each box packer make the rolls when repacking the box. It was found by using a few men to make rolls rather than each box packer making the rolls, a much more uniform packing could be secured and that high and low spots in the packing in the box were eliminated. The rolls are loosely formed with only the loose strands wrapped around the roll to prevent it from falling apart before it is placed in the box. These rolls, in addition to being more uniform, were found to result in some savings in labor. (Factor No. 12, Fig. 5)

This article, with its accompanying graphs has told, in a general way, what the Norfolk and Western has done to bring about greatly improved conditions with respect to hot boxes without going into detail as to the facilities and methods by which this improvement was accomplished. A subsequent article will cover some of these details, particularly with reference to the reclamation plant mentioned in that part of the article dealing with Factor No. 3 and to the methods of servicing in transportation yards.



Alco-GE 800-Hp. Switcher

New design features six-cylinder in-line engine having 9-in. bore and 10½-in stroke. Tractive force, 40,000 lb.

AMERICAN Locomotive Company and General Electric Company have introduced an 800-hp. switching locomotive with a new diesel engine designed especially for it.

The locomotive has continuous tractive force of 40,000 lb. with 60 m.p.h. gearing. Its base weight is 230,000 lb. and as a modification can be ballasted to a maximum fully-loaded weight of 248,000 lb.

The Alco-GE 800-hp. switcher has an overall length of 44 ft. 11 in., with a wheelbase of 30 ft. The truck wheel base is 8 ft. 0 in. The locomotive is equipped with the same four-wheel trucks as the Alco-GE 1,000-hp. switcher except for the traction motors which are the GE Type 752 motor normally used on the road locomotive. This is a higher-rated traction motor than is used on the 1,000-hp. switcher. The truck has two axles, two motors and is the swivel pedestal type. The wheels are 40 in. diameter and the journal bearings of the solid type.

New Alco In-Line Engine

The four-cycle engine, known as Model 251A, is an Alco in-line design introduced with this locomotive. It has 6 cylinders of 9-in. bore and 10½-in. stroke and develops its rated horsepower at 1,000 r.p.m. The engine incorporates features of both the Alco Series 244 V-type,

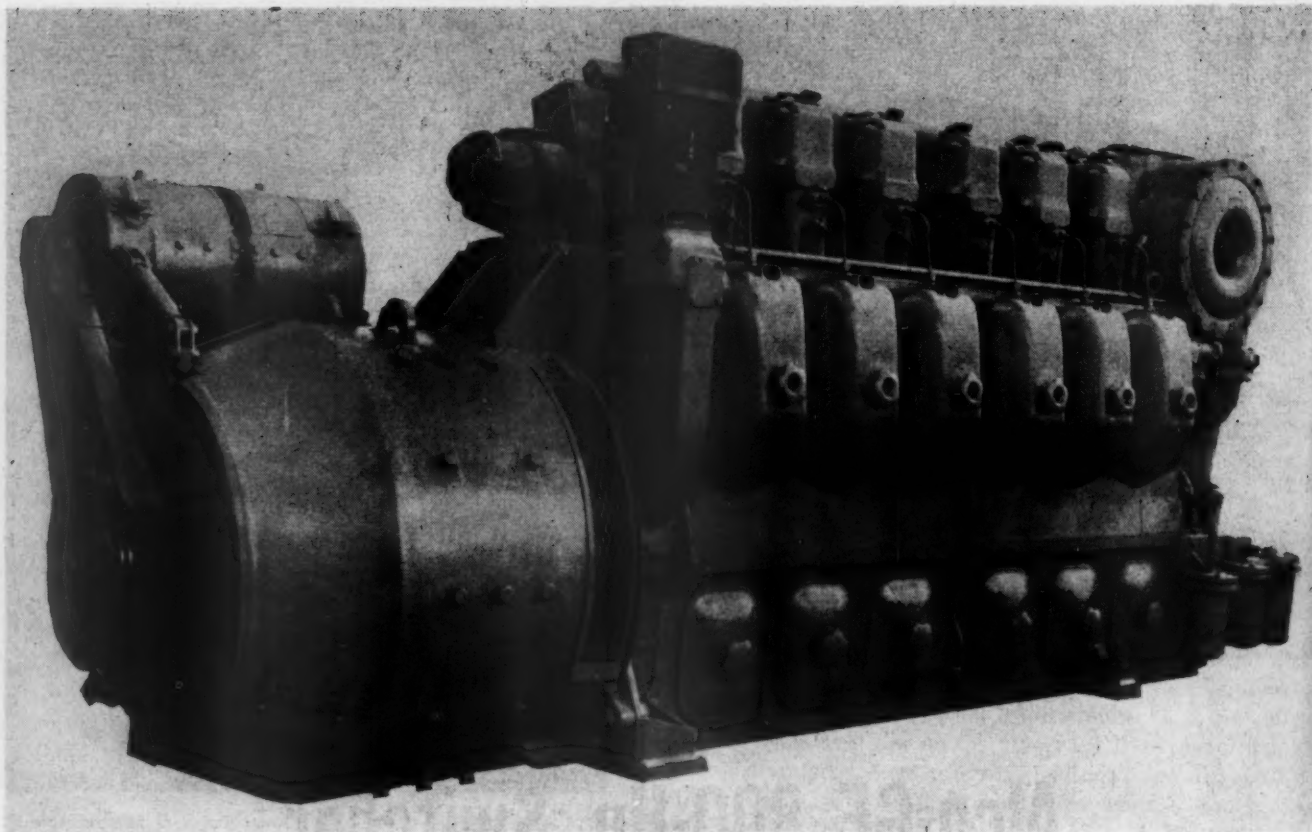
9-in. by 10½-in. engine and the Alco Series 539 in-line 12½-in. by 13-in. engine.

One of the features of this new engine is a lubricating oil system including filters, strainers, cooler and pressure regulator which is built integral with the engine and is mounted on the cylinder block. This arrangement eliminates external lubricating oil piping normally found on the locomotive chassis.

It is equipped with self-draining radiators, a feature allowing use of a cooling water system with a capacity of only 85 gal. In cold weather, this permits fast warm-up.

The positive displacement, gear-type lubricating oil pump is driven by gears from the crankshaft. All engine jacket water passes through the lubricating oil cooler. Two lubricating oil filters of the waste-packed type are utilized at full capacity for all engine speeds. A fine-mesh lubricating oil strainer of the screen basket type is piped to strain lubricating oil just before delivery to the engine. A low lubricating oil pressure shutdown switch is mounted on the engine and operates through the governor to shut down the engine.

The cylinder block is fabricated steel with forged main-bearing saddles. The block itself provides water jacket for cylinder liners. The base, which also serves as the oil



The Alco six-cylinder, Model 251A, 800-hp. engine.

sump, is fabricated steel and is provided with four baskets for bolting to the locomotive underframe.

The crankshaft is one-piece forged and hardened steel, counter weighted and with seven main bearings. Connecting rods are drop-forged steel, suitable for precision-type crankpin shells and piston pin bushing. Oil-cooled cast iron pistons are designed for long ring-land life. Cast iron cylinder heads are equipped with two intake and two exhaust valves.

Water-Cooled Turbocharger

The engine is turbo charged with an Alco 320A water-cooled turbocharger with a cast-iron casing. Individual fuel injection pumps are mounted adjacent to each cylinder and completely enclosed. The governor is the hydraulic type with solenoid shutdown. The mechanical overspeed trip automatically stops the engine when it overspeeds.

The camshaft gears are forged steel of single helical type. A special bar designed to engage a circular slot in the generator fan permits barring for setting crank positions. A crankshaft extension is used on the free end of the engine for the connection through a coupling to an air compressor and radiator fan.

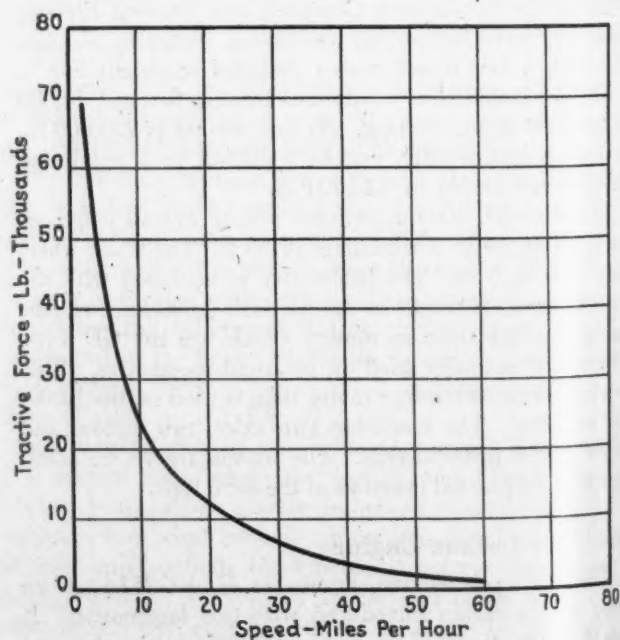
A primary fuel filter of the waste-packed type and a secondary fuel filter of the paper-disc type are mounted on the engine. The entire fuel system is designed to avoid any lube oil dilution.

A positive crankcase exhaust fan, driven by an electric motor, is mounted on the generator end of the engine.

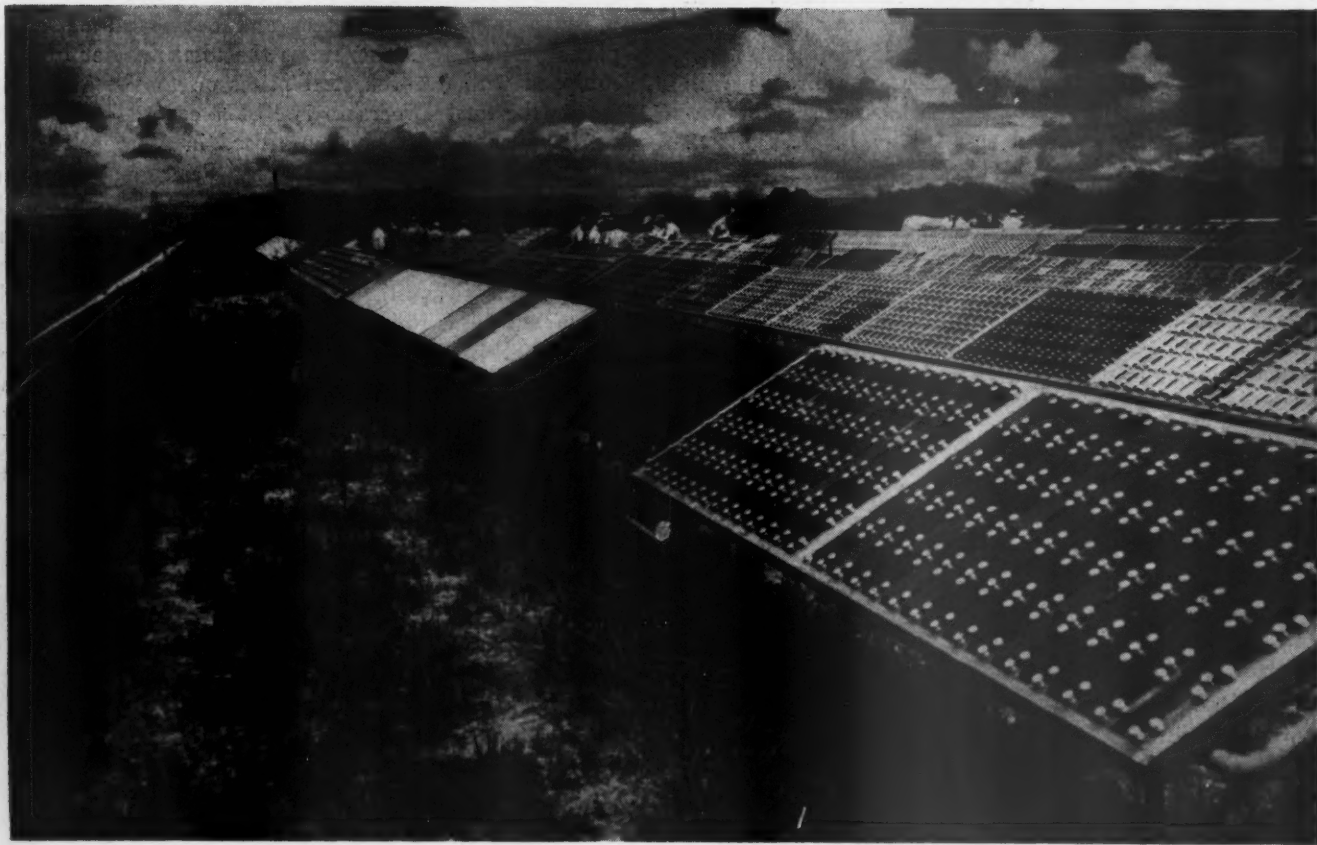
The 800-hp. switcher is equipped with the Schedule

6SL brake equipment designed especially for switching service.

The fuel storage tanks have a capacity of 635 gal. and the sand boxes 26 cu. ft. There being no steam generator, the locomotive is not equipped with water storage tanks.



Speed-tractive-force chart.



Atmospheric test racks at Kure Beach, N. C.

Corrosion Problems In Railway Equipment

Fourth annual Corrosion Conference at Wrightsville N. C., discusses hopper-car tests, protective coatings and corrosion in diesel engine shaft bearings.

A TOTAL of 80 railroad men and manufacturers' technical representatives gathered at Wrightsville Beach, N. C., May 19-21, inclusive, for the Fourth Railroad Corrosion Conference sponsored by the International Nickel Company for the purpose of bringing into the foreground the many problems of a varying nature with which the railroads are confronted, not only with cars and locomotives, but with structures and other facilities as well. The program this year was spread over a period of three days including three technical sessions and two inspection trips. One of the inspection trips was to the atmospheric exposure test racks at Kure Beach where some 25,000 specimens have been tested on racks 80 and 800 ft. from the ocean. These specimens cover a range of metals of all

types including the newly developed TRC stainless steel, wood, rope, protective coatings, plastic screening, etc. The second inspection trip, to the Harbor Island testing station of the International Nickel Company, where specimens of metals of all types, protective coatings, wood and rope are tested by sea water immersion. This station also includes a museum where many of the metals which have been removed from tests are displayed.

At the first technical session there was an open discussion of (1) corrosion as a factor in the failure of diesel engine crankshaft bearings. This discussion was led by D. P. Cassidy, American Locomotive Company, and R. S. Schaefer, Cleveland Graphite Bronze Company; (2) the proposed means for controlling scaling and cor-

rosion in boilers, led by F. L. LaQue, International Nickel.

The second technical session involved four papers, two of which, of interest to mechanical department men, were:

(1) comparative service experience of railroads with high-strength low-alloy, copper-bearings and plain carbon steels. This discussion was led by L. W. Doggett, Virginian, and T. Fredriks, New York Central System.

(2) Progress report on protective coating compounds for hopper car interiors. This was a prepared report, with slides, by C. L. Crockett, Norfolk & Western, and was designed to bring up-to-date data presented at 1952 meeting.

The third technical session, on Thursday, included a discussion of the use of corrosion inhibitors not containing chromates in railway diesel engine cooling systems, the reasons for their use, their effectiveness as developed by extensive laboratory and field testing and the methods used to check dosages as well as the effect of these inhibitors on lubricating oils. This discussion was led by Dr. John Ryznor, National Aluminate Corporation, and J. W. Wilkes, Dearborn Chemical Company.

The closing technical paper of the Thursday session was a review of experience with TRC and other manganese modified stainless steels by G. L. Snair, Allegheny Ludlum, E. E. Chapman, Santa Fe, and G. A. Lux, Oakite Products, Inc. C. B. Allen, Budd Company, and E. Gruca, Pullman-Standard Car Manufacturing Company.

F. L. LaQue, International Nickel Company, acted as general chairman of all the meetings.

Included in this issue is the technical paper on the experience of the Virginian with various steels in hopper cars by L. W. Doggett and a brief abstract of a discussion which followed this paper. Other technical papers presented at this Conference will appear in subsequent issues.

Factors in Hopper-Car Design on Virginian

Based on extensive tests and available records showing the service life of hopper car plates of Cor-Ten steel to be 50 to 100 per cent greater than open-hearth copper-bearing steel, the Virginian decided, to use Cor-Ten steel plates in the construction of hopper coal cars and gondola cars in rather large quantities. In 1947 and 1948, 999 hopper cars were built with Cor-Ten steel plates having $\frac{3}{16}$ -in. thick sides, $\frac{1}{4}$ -in. thick upper floor sheets and ends, and all other plates $\frac{5}{16}$ in. thick. Also, in 1948, 1,000 hopper cars were built using the same steel with plate thicknesses the same as the above cars, except the sides were $\frac{1}{4}$ in. thick. During 1950 to 1952, 500 more of the same type of cars were built making a total of 2,499 new 50-ton capacity hopper cars built to date with Cor-Ten steel plates.

During 1948 and 1949, 500 high-side 50-ton capacity gondola cars were built using Cor-Ten steel plates. The sides were $\frac{1}{4}$ in. thick and all other plates $\frac{5}{16}$ in. thick, making a total of 2,999 hopper and gondola cars built new to date with Cor-Ten steel plates.

In addition, 2,400 50-ton capacity hopper cars are now undergoing heavy repairs for the first time. The original open-hearth copper-bearing steel plates are being replaced with Cor-Ten steel plates. Of the 1,874 cars which are now completed, about 75 per cent had $\frac{1}{4}$ -in. thick sides, upper floor sheets, and ends, and all other plates $\frac{5}{16}$ in.

thick. The remaining 25 per cent had $\frac{1}{4}$ -in. thick sides, $\frac{5}{16}$ -thick upper floor sheets and ends, and all other plates $\frac{3}{8}$ in. thick. This raises the total number of cars equipped with Cor-Ten steel plates on the Virginian to 4,873 (the total ownership is 15,477 cars).

All plates and rolled shapes used in the construction of these cars were reworked in the Princeton shop with the exception of the door plates and the corrugated steel ends for the gondola cars. No more difficulty has been experienced in fabricating Cor-Ten steel plates even in sub-zero weather, than open-hearth steel, provided minimum inside radii suggested by the steel manufacturer are used. However, it has been found that the "spring back" is different from open-hearth steel and, it was desirable to modify the existing dies. The same welding procedure has been followed using the same type of electrodes as for open-hearth steel and no difficulties have been experienced.

These cars are semi-welded design with the floors, crossbridge sheets, etc., welded in place with a continuous bead on the inside of car and intermittent weld on the outside, which is the standard practice regardless of the type of steel used.

It has been found that hopper cars having sides $\frac{3}{16}$ in. thick of open-hearth copper-bearing steel will last approximately eight to nine years before the sheets begin to fail. By patching, the cars can be kept in service another two to three years. With $\frac{1}{4}$ -in. thick sides, the sheets begin to fail in ten to eleven years (what is meant by "begin to fail" is that cracks approximately 2 in. or more in length develop adjacent to line of rivets in side still or lower portion of side stakes, or both).

Comparison of the service life of this steel to that of open hearth copper-bearing steel is quite difficult as no thickness measurements or weights were determined before application. Visual inspection after five and one-half years shows that the corrosion of these cars is not as severe as similar cars of the same age built with open hearth copper-bearing steel plates.

Some figures of weight loss in pounds, however, were obtained by determining the average light scale weights of 100 new cars, built in 1947 with Cor-Ten steel plates and the average light weight at the last re-weighting of the identical cars. The loss of weight in pounds was found to be:

	Cor-Ten steel	Open-Hearth Copper-bearing steel
Average number of months cars were in service.....	51.37	48.82
Total loss of weight in pounds—100 cars.....	58,900	70,500
Average loss of weight in pounds per car.....	589	705
Average loss of weight in pounds per car per month	11.47	14.44

In other words, the loss in weight per car, per month, was (14.44 minus 11.47) plus 11.47 minus 25.9 per cent greater for cars equipped with open-hearth copper-bearing steel plates than the cars having Cor-Ten plates—assuming that the weight loss was in the car bodies in both instances.

The present practice of the Virginian when building new hopper cars or making heavy repairs for the first time to existing cars is to make all plates of Cor-Ten with the sides $\frac{1}{4}$ in. thick, upper floor sheets and ends $\frac{5}{16}$ in. thick, and all other plates, including door plates, $\frac{3}{8}$ in. thick. Cast steel door frames of substantial heavy section, as well as cast steel inside braces and rolled steel wheels are also used. With this construction it is felt that such cars can be kept in regular service twenty years or more

before making heavy repairs; after which four years can be added by patching.

A great deal can be accomplished to increase the life of a car between shoppings through improvement in design not only for static and impact loads or forces, but design against corrosion, fatigue stresses caused by vibration, including the car shaker. These problems have been under consideration for some years which has resulted in several changes in hopper car design to increase the period between shoppings and decrease maintenance cost.

In addition to using heavier Cor-Ten plates, the Virginian has also incorporated the following into its recommendations:

1. Increase the center sill area from 24.24 sq. in. to 30.12 sq. in. or the weight from 82.4 lb. per ft. to 102.4 lb. per ft. (standard A.A.R. Z sections).

2. Added two heavy $\frac{1}{2}$ -in. thick gusset plates at each eye-beam body bolster (welded in place four per car) to prevent car body from shifting on sill.

3. Welded two additional $\frac{3}{8}$ -in. thick gusset plates under each crossbridge sheet.

4. Applied $\frac{1}{2}$ -in. thick plate to each end of eye-beam bolster by welding to reduce shear stresses on web of bolster.

5. Extended the length of $\frac{3}{8}$ -in. thick diagonal brace gusset at center of car, at body bolster, and welded it to the bottom flange of the eye-beam bolster to act as a re-inforcement to the bolster.

6. All floor plates, hood sheets, etc. are kept clear of the center sill.

7. Substituted $\frac{3}{4}$ -in. diameter rivets in place of $\frac{5}{8}$ -in. rivets in top side bulb angles, bolster stakes at body bolster connect; also doubled the number of rivets in central portion of side stakes to approximately half the depth of side, from the top, to better resist the effects of the car shaker.

Additional service life will be obtained per unit of thickness by increasing the total thickness of plates over A.A.R. practice. Such plates will neither be as highly stressed initially nor fail from fatigue stresses as rapidly.

The condition of the center sill has been the deciding factor whether to scrap or re-build a hopper car. In more or less conventional designs of hopper cars certain plates come in direct contact with the center sill. This type of construction is susceptible to corrosion between the plates and the center sill, accelerated by the acid from the coal seeping in through rivet holes, etc., and eventually destroying the sill at that point. For this reason considerable thought has been given to using center sills of Cor-Ten. In either case, it seems desirable, as well as economical, to provide a substantial center sill and bolster construction to increase the life of the car, and especially so, when using Cor-Ten steel plates. In other words, it is important as well as economical to provide an under frame that will have a satisfactory service life in proportion to that obtained by the use of low-alloy high-tensile steel body plates.

Discussion

C. Hankins, Wine Railway Appliance Company, in the discussion of Mr. Doggett's paper, brought out that there are a number of factors that enter into the corrosion

of open top equipment. The type of coal hauled by the different roads has an important bearing on the matter of corrosion in hopper cars, he said, and will produce entirely different results. West Virginia coal produces one type of corrosion, Illinois coal another and likewise Pennsylvania anthracite. Mr. Hankins pointed out that in the design of the Virginian hopper cars there has been a successful combination of both riveting and welding which has produced a car particularly resistant to corrosion for the type of coal handled in the district traversed by that road. A problem with hopper cars, he said, is one of building a car of such design and construction that it is economical to maintain rather than one that is good to look at but difficult to maintain.

It is important, Mr. Hankins said, to keep the leachings from the coal out of the seams of the car. A particularly difficult spot is the top of the center sills where leachings settle and corrosion is serious because of the fact that it does not get an opportunity to wash away. Where this deposit lays on top of the center sill the natural evaporation as a result of the movement of the train, for example, takes the water out and leaves a particularly corrosive substance on top of the sill. When the car goes out again more corrosive material comes through as a result of rain and helps to build up a high concentrate of corrosive material. In concluding his remarks, Mr. Hankins said that he was convinced that both the Virginian and Norfolk & Western are on the right track in the matter of plate thicknesses in hopper cars. Lightweight sheets, he said, will give a satisfactorily longer life in passenger cars where they are not subject to the same corrosive elements as they are in coal service but when it comes to plate thicknesses in hopper cars an increase in thickness must not only be made but some sheets in hopper cars must, of necessity, be thicker than others in order to equalize life of sheets under different corrosion rates.

■ ■ ■



At the Springfield, Mo., rip track of the St. Louis-San Francisco a steam gun is used to remove grease, oil and road dirt from the wheel plates on used mounted car wheels before turning journals. The cleaning takes about a minute a wheel and is said to result in (1) the elimination of fouled-up cutting tools and burnishing rollers of axle lathes which would otherwise be caused by the accumulation falling off while the journals were being turned, and (2) better inspection of the plates of wheels for cracks or other defects.



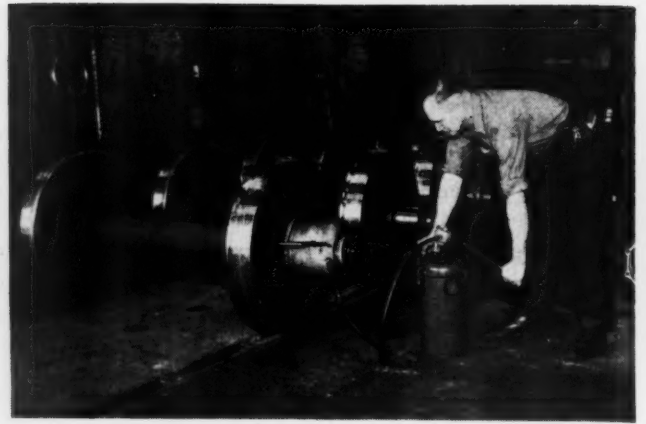
Shop air pressure forces cleaning fluid clear through roller bearings and out the far side to assure removal of all old grease.



The canister fits snugly over outer race and around the split filler ring which seals against leakage on the inside end.



Wheel seats are not turned to step sizes on secondhand axles, but miked individually after a minimum cut and the wheel bored to fit.



Reading the gage on the container tells when the right amount of grease has been added as the canister over the outer race prevents leakage.

T & P Wheel

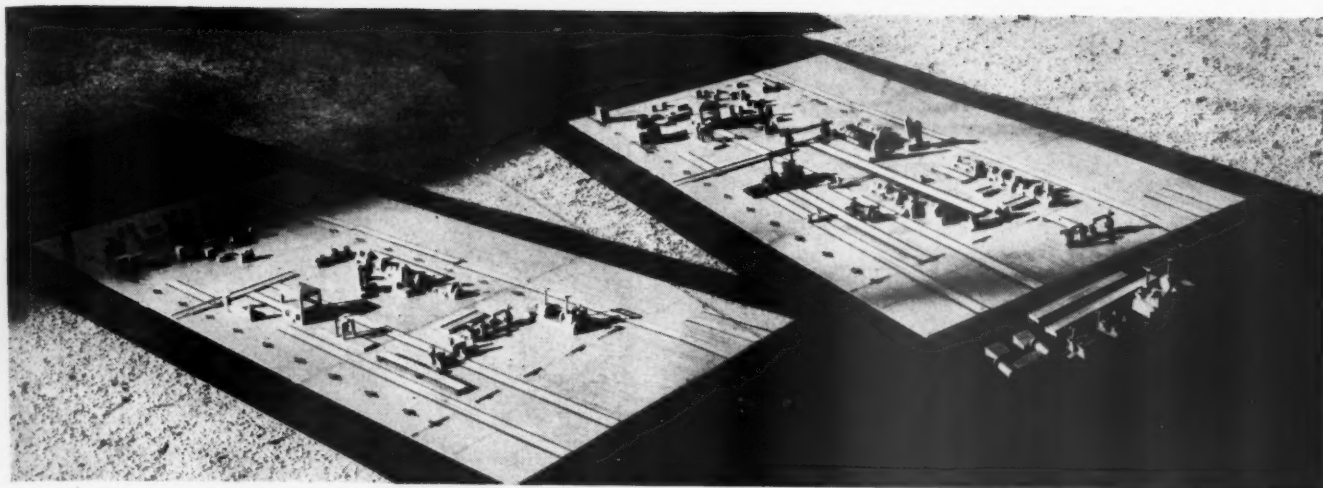
WHEN the mechanical department of the Texas & Pacific decided to make a study of the requirements for a new wheel shop layout at Marshall, Tex., they decided also to make the preliminary study as thorough as possible by going one step further than is usually done—or perhaps that has ever been done—in laying out a new wheel shop. They built a scale model of the building floor area, the equipment in the existing shop and that to be installed in the new layout, at which all types of wheels would be handled for the entire system.

The model was in addition to, rather than in place of, the conventional steps involved in arriving at a proposed layout. The road first thoroughly explored possible layouts on paper, held conferences and made numerous visits to wheel shops of other roads. After arriving at what they felt was the ultimate design on paper, incorporating the best ideas from the shops visited, the model was arranged to conform to the latest sketch. Then, the various movable parts of the model—tracks, axle racks, lathes, boring mills, wheel presses, cleaning machine and inspection equipment—were shifted around to investigate additional layout possibilities.

The layout adopted as a result of shifting around and studying the model was substantially different from that which was considered the ultimate that could be reached on paper alone, and it is felt that the improvement in efficiency that should be attained will fully justify the time and expense involved in making and studying the model. It was particularly helpful in overcoming the handicap of laying out a wheel shop in a stub-end area, making it necessary to take completed work out the same end at which unfinished work entered.

The Layout and Equipment

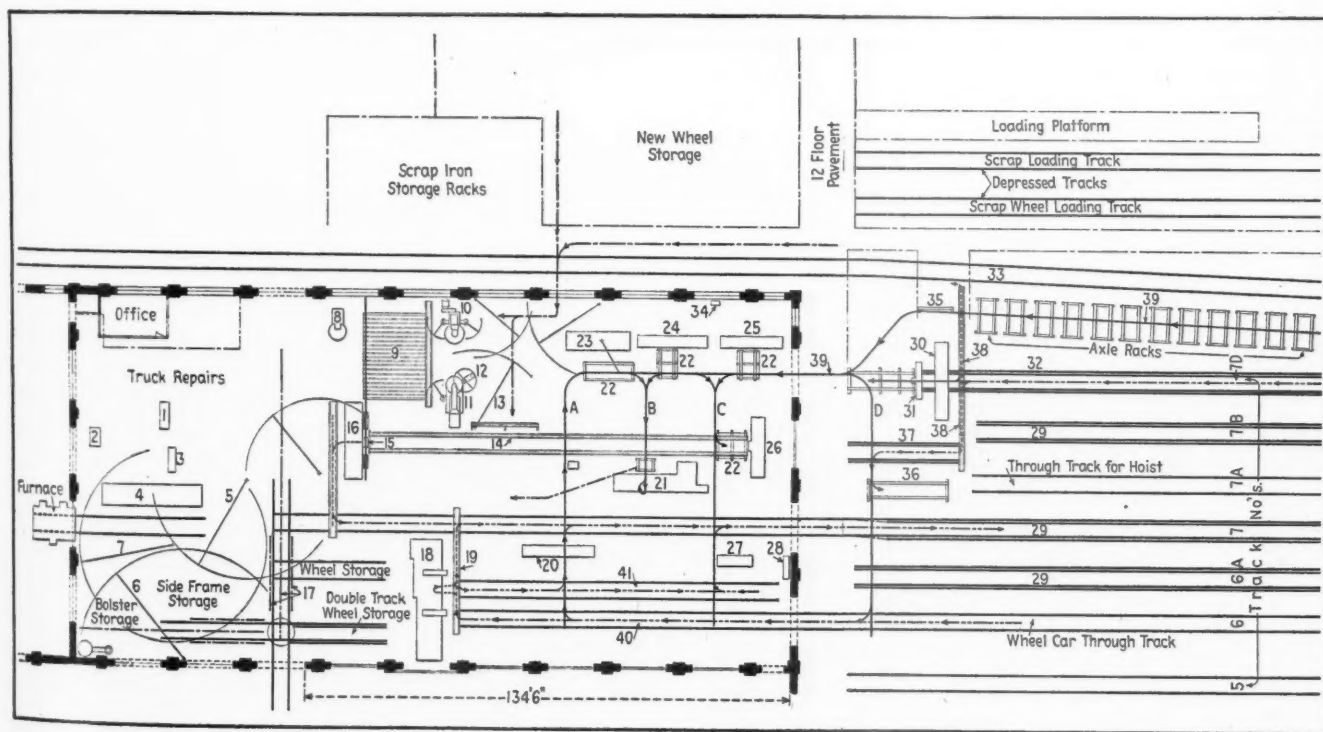
The completed shop occupies an area 98 ft. by 178 ft. 9 in. in the northeast corner of the freight car shop building at Marshall. The outdoor area north of the



The scale model of the shop as it was (left) and as now laid out (right) by shifting around movable models of machinery and tracks.

Shop at Marshall, Tex.

Newly opened facility, handling car and diesel work for entire system, was laid out with the aid of a scale model.



1. Face plate
2. Furnace
3. Bull dozer
4. Face plate
5. 28-ft. jib crane
6. 28-ft. jib crane
7. 26-ft. jib crane
8. Boring mill
9. Gravity-feed wheel rack, capacity 120 wheels
10. 48-in. Niles wheel borer

11. 52-in. Betts wheel borer
12. Pneumatic loader
13. 20-ft. jib crane
14. Gravity feed axle rack
15. Pneumatic lifting device
16. Baldwin 800-ton wheel press
17. Monorail with two-ton hoists
18. 52-in. Niles car wheel lathe
19. Dolly track
20. 56-in. Niles journal lathe
21. 120-in. Landis cap grinder

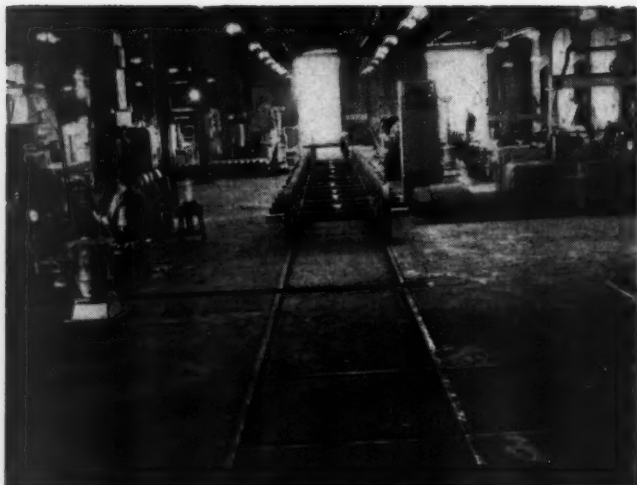
22. Axle rack
23. 40-in. American engine lathe
24. Betts axle lathe
25. Niles axle lathe
26. Sellers axle and journal lathe
27. Work bench
28. Wash tank
29. Double wheel storage tracks
30. 500-ton demounting press
31. Axle cleaner
32. Demounting track

33. New wheel and axle unloading track
34. Floor grinder
35. Scrap wheel storage
36. Scrap axle rack
37. Wheel storage for wheel and journal turning
38. Dolly track
39. Monorail with two-ton hoist
40. Incoming wheel track
41. Proposed track

Floor plan and material-flow diagram of the Texas & Pacific's new wheel shop at Marshall.



Wheels are delivered into the shop six at a time by a fork lift truck with a detachable loading arm.



Looking down the outgoing wheel track. The small burner toward the left heats diesel thrust collars for application.

building is devoted to scrap iron storage racks, a concreted storage space for new wheels and a loading area. The latter has two depressed tracks, one for scrap wheel loading and one for trash loading, with a platform along the outside edge of each.

The wheels in the storage area are grouped by types, with the type of wheel in each group indicated by a small metal sign. This system offers maximum flexibility to change the amount of storage space devoted to any group as conditions change, and it does not require changing a fixed layout for such things as stockpiling one type of wheels for a car building program.

Mounted wheel sets are stored on trackage east of the shop building. Two of the tracks extend into the shop, one being the outgoing wheel track and the other the incoming wheel track. Outdoor axle racks are located between the wheel demounting track (7D) and the wheel and axle unloading track (8). The demounting press, the axle cleaner and two axle storage racks to serve the press and cleaner are also located east of the shop.

The axle rack which feeds the cleaner is a simple single-tier rack with one end bolted to the cleaner and the other end supported by columns. Feed is by gravity with a slope of $\frac{3}{8}$ in. per ft. Control of feed is by a lever-operated stop with a handle within easy reach of the helper who runs the axle cleaner from his regular

station for running the cleaner. The loader stops automatically as an axle goes through the rack. The axles are discharged from the cleaner to a single-tier rack 14 ft. long.

The principal machinery installed in the shop is listed in Table 1. Material handling equipment is divided into five principal classifications: Monorail systems, gravity-feed axle racks, dolly tracks, jib cranes and miscellaneous shop trucks.

There are three monorail groups. One comprises four short individual lengths, two running east-west and two running north-south. These four are located in the truck parts repair area and are about 20 ft. long. The second is a single run 55 ft. long along the west edge of the bored-wheel storage rack between the north wall and the wheel press.

The third and principal monorail system begins at the eastern end of the series of outdoor axle racks and extends into and about half way through the shop building in a general east-west direction. This portion of the main monorail system serves the outdoor axle rack, two small racks with a capacity of 15 axles each which supply two car axle lathes and a third rack which holds twenty diesel locomotive axles to feed the diesel wheel lathe. The latter connects with a 2-ton, 20-ft. jib crane which covers the diesel axle rack and the 40-in. lathe.

TABLE 1—MACHINERY AND PERSONNEL ASSIGNMENTS AT THE MARSHALL WHEEL SHOP - T&P WHEEL SHOP

Machine	Manufacturer	Motor hp	Uses	No. of shifts operated	Personnel per shift
Axle lathe*	Niles	25	Rough turn car wheel seats, journals	One	1 Machinist
Axle lathe*	Betts	25	Rough turn car wheel seats, journals	One	1 Machinist
Axle lathe (40-in.)	American	30	Turn diesel axles all over	One	1 Machinist†
Grinder (120-in.)	Landis	30	Grind diesel axles	One	1 Machinist†
Journal lathe (56-in.)*	Niles	25	Turn journals on mounted wheel sets	Two	(1 Mach. and 1 Appr.) and (2 Machinists)
Car wheel lathe	Niles Bement-Pond	75/100	Tread turning on mounted wheel sets	One	1 Machinist
Combination journal and axle turning lathe	Sellers	10 (2)	Turn 2nd hand axles and finish rough-turned new axles	Two	2 Machinists
48-in. boring mill	Niles	30	Bore steel car wheels and diesel wheels	One	1 Machinist
52-in. boring mill	Betts	15	Bore chilled car wheels	One	1 Machinist
Wheel press-800 ton	Baldwin	15	Mount car and diesel axles—Press traction motor gears on	One	5 Helpers
Demounting press (500 ton)	Niles	10 (2)	Demount car and diesel axles and press diesel traction gears off	One	Wheel Checker
Magnaflux machine (moveable)	Magnaflux	—	Inspect axles	One	1 Helper‡
Axle cleaner	Garon Metal Products Co.	3	Clean all car and locomotive axles	One	

*Center drive converted to end drive.

†Runs both 40-in. lathe and grinder.

‡One of the five helpers from the wheel press gang.

Four major branches emanate from this east-west stem of the main monorail. All extend in a north-south direction. The most westerly one (A) extends to the incoming wheel track near the south side of the building, serving the 56-in. journal lathe. The second branch (B) extends as far as the gap grinder; it serves the grinder and the diesel axle rack which supplies this grinder.

A third branch (C) near the east end also extends as far south as the incoming wheel track, passing the roller bearing work area on the way. This branch delivers second hand and rough-turned new axles to the main indoor axle rack. The fourth branch (D), which also runs north and south, is outdoors and serves the tracks beyond the east end of the shop.

The main east-west branch also connects indirectly with a 30-ft. east-west monorail which runs outdoors over Track 7D, extending past the demounting press and the axle cleaner to the outdoor axle rack. This branch holds the axle up for removing the wheels after they have been pressed off and places the axle on the table of the cleaner. Movement on the axle cleaner, and from it to the rack where the axle will be picked up by the main monorail, is by gravity with control by lever-operated stops.

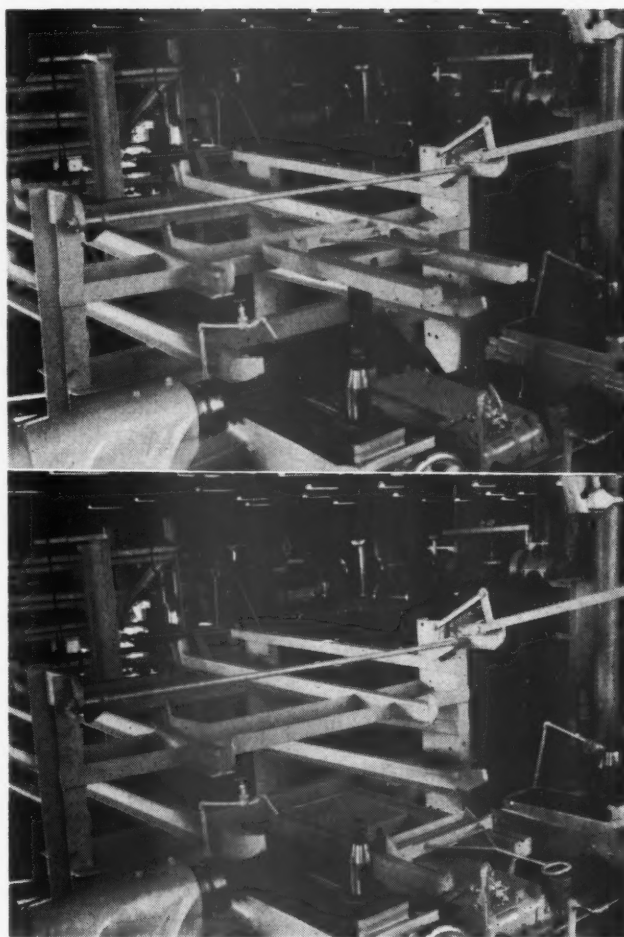
Axle Handling Minimized

A second classification of material handling equipment, using this term somewhat loosely, is a gravity-feed axle rack extending the 95 feet from the storage rack for the combination journal and axle turning lathe east to the wheel mounting press. This rack, with a storage capacity of 130 axles, slopes downward toward the wheel press. Approximately in the middle it has a ten-foot level section alongside which is located the Magnaflux machine for inspecting axles.

By using a gravity-feed rack for axle movement, the wheel press is fed from the axle-finishing machine over 100 ft. away without further handling of the axle. The location of this rack likewise serves a purpose. It runs close to the two boring mills for miking the wheel seats to determine the wheel bore diameter. Step sizes are not used at Marshall for reasons explained later in this article.

A third method of material handling employed at Marshall is the use of dolly tracks, of which there are four running north and south. One such track 38 ft. long handles mounted wheel sets from the mounting press to the outgoing wheel track; a second, 35 ft. long, runs along the front of the 52-in. car wheel lathe to bring mounted wheel sets to this lathe from the incoming wheel track, and to deliver the wheel sets from this lathe to the outgoing wheel track; the third runs in front of the rack for bored wheels, delivering the wheel to the appropriate slot; the fourth runs outdoors from the track (7B) past the demounting track (7D) and on to the outdoor axle racks. It is used to dispose of scrap wheels from the demounting press and for emergency movement of mounted wheels toward the incoming wheel track.

Seven jib cranes are located at strategic points throughout the shop. Three are in the truck repair area. The other four have a 20-ft. radius and a 2-ton air hoist, with the exception of the one for the Niles mill which has a 16-ft. radius. Two are along the north wall, one serving the diesel locomotive axle rack and lathe, the



The axle rolls by gravity from the top tier of the rack on the dolly of the pneumatic lifter (above). Lowering the lifter and moving the dolly lines up the axle for loading (below). The procedure is reversed to discharge the axle to the lower tier. This type loader is used on the two car axle lathes and on the combination journal and axle turning lathe.

second serving the 48-in. boring mill and a storage area which holds 65 wheels. This crane is used for placing wheels on the loading block for the 42-in. Niles mill. A third located by the 52-in. boring mill serves the mill and the 100-wheel storage area.

The fourth jib crane is end-supported through an arc of approximately 160 degrees and is located 11 ft. west of the wheel press. It covers the area where diesel axles with the traction gear in place are stored. Principal uses are: (1) to unload the gear and axle from the fork lift truck which brings axles with the traction gear in place into the shop from the demounting press and the 40-in. American lathe; and (2) delivering the axle to the wheel press for pressing on the gear and wheels.

The final method of material handling is by fork lift truck, one of which delivers all loose wheels and brings diesel axles in the door by the American lathe and takes the axle from this lathe to where it can be picked up by the end-supported jib crane.

Procedure Through the Shop

The procedures followed at the Marshall Wheel Shop, and the reasons for laying it out according to the present floor plan, can perhaps best be understood by tracing the following different types of wheel work through the shop:



The end-supported crane with the two-ton air hoist loads and unloads diesel axles with traction gear in storage area.



Bored wheels are stored next to the wheel-press end of the gravity feed rack and carried to the mounting station by the monorail hoist in the background.

1. Car wheels sets (solid bearing) to be demounted, axles refinished and the axles fitted with new or O.K. secondhand wheels.
2. Making up new car wheel sets.
3. Car wheel sets requiring tread work or journal work but no demounting.
4. Diesel wheel sets.
5. Roller bearing work.

All wheel sets, whether to be demounted or merely to have journal or tread work, are unloaded from the wheel car on Track 6 by a Brown hoist. Those in the first work group, that is with axles to be re-worked and fitted with new wheels, are stored on Track 7D, down which they are rolled by hand to the demounting press at the west end of this track. The wheels, after removal and inspection outdoors are carried either by lift truck to the storage area for O.K. wheels or to the scrap wheel storage by the dolly track which runs in front of the demounting press.

The axle is cleaned on a machine next to the press to which it is carried by the over-head monorail. After cleaning with wire brush the axle is stored on a rack on which it drops automatically from the cleaning machine. It is handled by monorail hoist between this rack and the top tier of a second storage rack located at the east end of the gravity feed rack. The axle feeds directly to the Sellers lathe by gravity, where the journals and wheel seats are turned. It is then discharged by gravity to the low tier of this rack which connects directly with the 95-ft. gravity feed rack for delivery without further handling to the wheel press at the opposite end of the shop.

The axles move down this rack by gravity to the level section near the center where they are given Magnaflux inspection. Those condemned are removed from this area by the branch A of the monorail which runs directly over the level section. The condemned axle is carried outdoors along the main branch through the point at which demounted axles enter the shop, and then south via D to the scrap axle rack on the west end of Track 7A.

Axles that pass inspection continue to roll by gravity from the level section to the mounting press at the west end of the gravity-feed track. At this point the axle is

fitted with new or second-hand wheels. The mounted wheel sets are transferred by dolly to the outgoing through track (Track 7), along which it is rolled by hand out the east end of the shop for further movement by the outdoor branch of the overhead monorail to Track 6A, the storage track for completed wheel sets.

Boring the Wheels

The new or secondhand wheels to be applied are moved six at a time into the northwest section of the building from the outdoor wheel storage space by fork-lift trucks. These have been previously mated by tape sizes—new wheels as they are placed in storage, second-hand wheels as they are pressed off. They are placed in a 65-wheel storage area if steel wheels, or a 100-wheel storage area if cast iron wheels. After boring on the mill adjacent to the storage area, to which they are handled by the loader of the machine, the bored wheel is placed on a dolly track that runs along the east edge of the storage rack for bored wheels. This track runs close by both boring mills so that the wheels can be unloaded directly from the machine table to the dolly by the loading arms of the mills.

The Betts mill is fed by an air-operated duplex loader. This loader readies one wheel for loading while another is being bored and loads the second wheel on the machine table at the same time that it unloads the bored wheel. A collapsing platform raises and tilts the wheel to position for the tongs to grab for loading, and does the reverse for unloading.

The Niles mill has a single loading arm integral with the machine. The duplex loader is not used with this machine because—unlike the Betts mill which handles only 33-in. chilled cast wheels—the Niles mill bores different size wheels. The loading arm, while it lacks some of the advantages of the duplex loader, handles any size wheel without modification. The duplex loader, on the other hand, would require different tongs to handle different size wheels. Both mills have an unloading arm that places the bored wheel on the adjacent dolly track that feeds the wheel storage rack.

Each bored wheel is moved along this dolly track to its appropriate slot for storage until called for at the

wheel press. Each such slot slopes downward to the west to roll the wheels against a stop in the order in which they are placed in the slot. The wheels are moved to the wheel press by the monorail with a pair of tongs. The wheels are delivered to the east side of the press by this monorail, thus getting through production out the west end for all car wheels.

Step Sizes Not Used

On the Texas & Pacific, each wheel is bored to the fit size for the seat on which it is later to be mounted. While new axles are made standard, different wheel seat diameters are entirely permissible on a second-hand axle. Step-size axle-turning and wheel-boring are not practiced for two principal reasons: *First*, wheel boring capacity at Marshall is greater than axle lathe capacity. It is therefore an advantage to keep axle turning work to the minimum consistent with good wheel shop practice. *Second*, individual measurement keeps the wheel seat at maximum size. This improves the chances of fitting the axle when it comes back into the shop the next time. Finally, it does not reduce production because the axle rack is close to the boring mills, and the mill operator, while boring new wheel, measures the wheel seat for the next wheel to be bored.

Keeping the wheels and axles in the right order for mounting is no problem. Each boring mill operator marks the axle for the wheel seats he fits with his initial and a number, beginning with number one and two each morning. Thus an operator would mark the middle of the first axle 1-J-2, the second axle 3 J-4, the third 5-J-6. Wheels bored for these six wheel seats are numbered J-1 through J-6.

Each operator is assigned several of the 24 slots in the storage rack for bored wheels. These slots hold two wheels side by side, with the wheels placed in the slot in the order in which they are bored. Thus, when an axle arrives at the end of the gravity feed rack ready for mounting, the wheels which have been bored for its wheel seats will have to be at the delivery end of the sloping slot.

There is no way for an axle to overtake the one ahead of it on the gravity feed rack, nor can a pair of wheels get ahead of a previously bored pair in the slot. Similarly, there is no chance of a mixup between the wheels and axles worked by the different boring mill operators because both wheels and axles are marked and because each operator has his own slots for storing wheels.

Making Up New Wheel Sets

Where car wheel sets are to be made up from new

wheels and new axles the wheels follow the same procedure. The axles follow a similar procedure with two exceptions. *First*, the movement from the outdoor axle rack along the east-west outside monorail branch to the point where this outdoor branch joins the indoor east-west stem near the demounting press. *Second*, the axles make an additional stop on the way to the gravity feed rack at one of the two axle lathes which were converted from center-drive to end-drive.

The axles are rough turned on one of these two lathes and then handled in the same manner as before for remaining work. No particular division of work is made between these two machines, but each is normally kept on whatever type of axle it starts on for at least two days to minimize tool changes.

The two axle lathes were converted from center-drive to end-drive primarily to simplify loading and unloading. With the center-drive arrangement, the axles had to be handled by jib crane and maneuvered through the drive yoke for mounting on the lathe centers. The end-drive set-up permits use of the gravity rack and pneumatic lifter which place the axle in position for machining with a fraction of the former time and effort. During conversion of the drive, the gearing was also changed to increase the maximum turning speed of each machine from 40 to 200 r.p.m. to permit the use of carbide tools.

Journal and Tread Turning

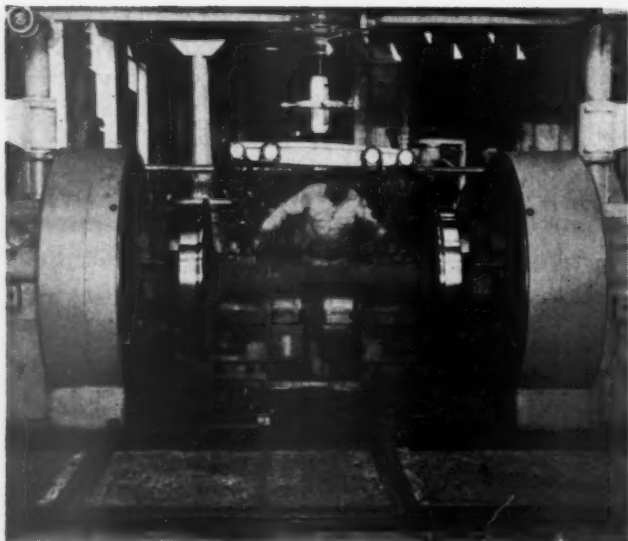
Mounted wheel sets requiring journal or wheel turning are unloaded from the wheel car on Track 6 by the Brown hoist and placed on either Track 6 or one of the double storage tracks depending upon availability of space. If placed on Track 6, which is the shop incoming wheel track as well as the wheel car track, the wheel set is later rolled by hand into the shop. If placed on one of the double storage tracks, the wheel set is moved to Track 6 when called for. This is done by the hoist when it is available.

When the hoist is not available, the wheel set can be moved to Track 6 from one of the storage tracks by the branch D of the monorail and the dolly that extends north from Track 7B. For example, if the wheel set is on Track 7D and the hoist is not available, the wheel set is rolled down 7D to the dolly track, carried by dolly to 7B, rolled to the west end of 7B, then handled by the outdoor north-south branch of the main monorail system to Track 6.

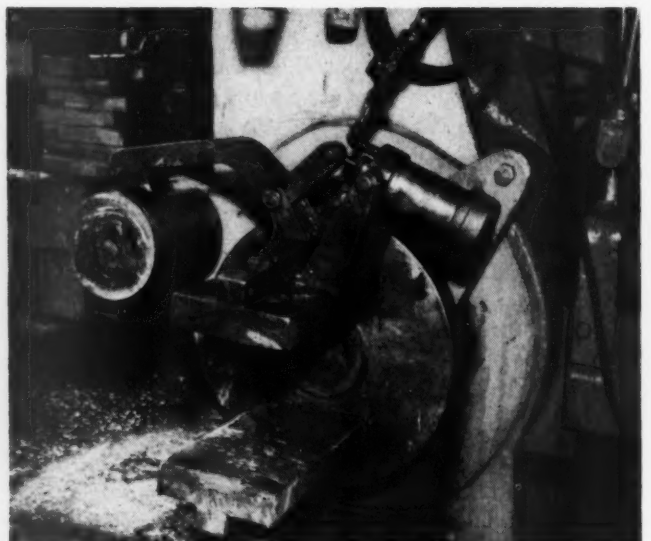
Journal and Tread Turning

Where treads require turning the wheels are rolled by hand to the west end of Track 6, transferred to the car

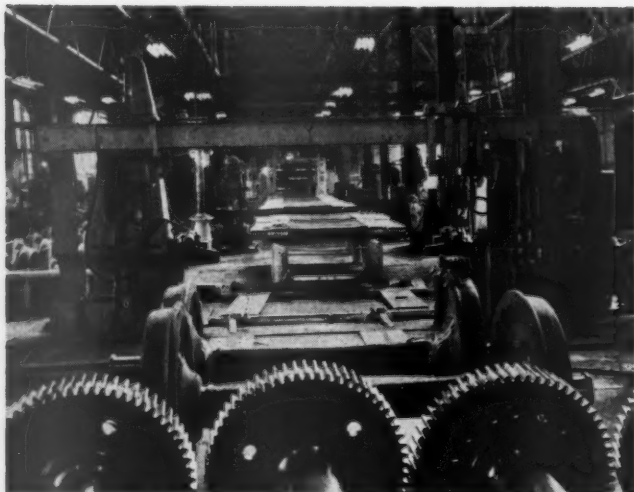
TABLE 2—DATA ON MACHINE OPERATIONS					
Operation	Machine	Type too	Mach. Speed r.p.m.	Feed In./Rev.	Average output grinding
Rough turn freight car axles.....	Niles No. 3	Carbide	160	.026	8
Rough turn freight car axles.....	27-in Betts	Carbide	200	.023	8-10
Finish turn freight car axles.....	Sellers combination journal & axle lathe	Carbide	200	.030	8-10
Bore Chilled wheels.....	Betts				
Rough Cut.....		Carbide	31	.10	80
Finish Cut.....		High-Speed Steel	31	.20	80
Bore Steel wheels.....	Niles				
Rough Cut.....		Carbide	70	.05	65
Finish Cut.....		High-Speed Steel	70	.025	65
Turn wheel set treads.....	52-in. N.B.P.	Carbide	27	.020	18
Turn wheel set journals.....	56-in. Niles	Carbide	222	.023	14
Turn roller bearing axles complete.....	American	Carbide	105	.037	6



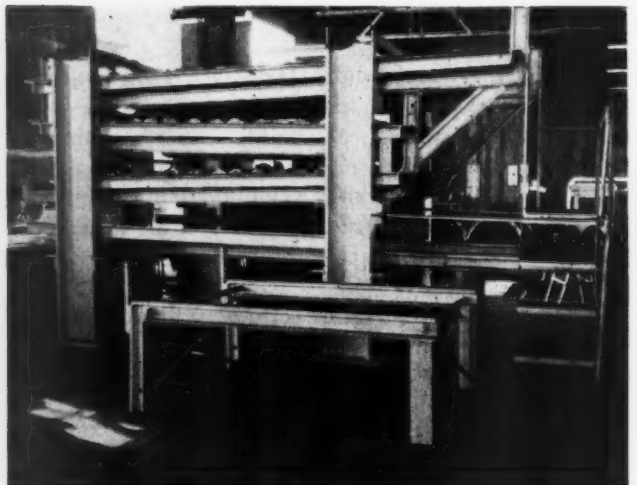
Niles car-wheel lathe with profiling attachment turns treads at 27 r.p.m. to within .0005 in. out-of-round.



The filler block on the wheel press for mounting wheels is raised into and out of position by a pneumatic cylinder.



Car-wheel mounting is a through operation, with the wheels placed on the axle on the far side of the press and discharged from the near side.



The 30-axle rack feeds the Sellers lathe through a pneumatic loader which also discharges axles directly to the gravity-feed rack.

wheel lathe on the short north-south dolly track in front of this lathe, the treads turned, the wheel sets again moved by the dolly, this time north to Track 7, and then rolled out of the shop on Track 7. Treads machined on this wheel are turned to within .0005 in. out of round.

Where journals need turning, but tread work is not required, the wheel set is picked up by the branch *A* of the monorail system about 30 ft. from the west end of Track 6 for delivery directly to the 56-in. journal lathe. When journal turning is completed, the monorail carries the wheel set the remaining short distance to Track 7 for wheeling out of the shop.

The 56-in. journal lathe was converted from center-drive to end-drive for the same reasons that the car axle lathes were converted—to facilitate handling and to permit carbide tooling. Rather than a straight gear drive as on the car axle lathes, the journal lathe has a fluid drive clutch and a triple chain sprocket drive, which increased the speed from the original maximum of 48 r.p.m. to 222 r.p.m. The same design of tool is used on

this lathe as on the Sellers and the two car axle lathes, permitting greater efficiency in tool grinding and a reduction in tool inventory.

Where both tread turning and journal turning are required, tread turning is done first. The wheels are then rolled by hand along the stub track between Tracks 6 and 7 to a point below the journal lathe, from which the set is picked up by the monorail for delivery to the journal lathe. Wheel sets to have roller bearings worked are wheeled further down the proposed track to the roller bearing repair area in the south east corner. Disposition of the completed roller bearing wheel sets is by the branch *C* of the monorail to Track 7 and wheeling out of the shop.

Roller Bearing Work

The boxes are removed from all incoming roller bearing wheel sets and cleaned in a lye vat 200 yards north-east of the shop. The inner race is pressed off so that the wheel can be pulled. If the bearing rolls good and

sounds good, it is merely cleaned up, removing the old grease and applying new grease. If it does not roll and sound good, the journal and inner race are miked and a visual inspection made of the rollers. The press fit of the inner race on the journal is .005 in., with a tolerance of plus or minus .001 in.

Axles are Magnafluxed all over when wheels are removed, all over but the wheel seats when the wheels are not removed. New axles are turned all over on the American 40-in. lathe to .010 to .012 in. oversize for finishing on the Landis grinder.

Greasing the roller bearings is done with the aid of an aluminum canister built at Marshall. The canister serves a double purpose. It eliminates spilling grease, and by so doing it enables the greaser to know exactly how much grease has been forced into the bearing. As there is no spillage, the reading on the dial of the container is the amount of grease that has been pumped into the bearing.

The canister fits snugly over the outer race of the bearing and a filler ring, with the open end secured tightly by two C-clamps against the inside bearing cover. The filler rings is split and fits directly around the axle between the inner end of the bearing and the wheel hub to block the grease from coming out this end. Two holes are drilled and tapped for 3/8-in. pipe threads 180 deg. apart near the outside periphery. These are for Alemite fittings. A third hole for the relief fitting is tapped with 1/8-in. pipe threads in the center of the canister face. Filling the bearing with the right amount of grease is a simple operation, done by attaching the hose fitting first to one lubricant hole and then the other. Pumping is continued by hand until the dial on the grease container indicates that the correct amount of grease has been supplied.

The T&P also employs a neat method for cleaning roller bearings. One end of one hose is dipped into a container of Stoddard. The other end connects to a mixing valve on a second hose which is connected to the shop air line. Turning on the air provides a powerful stream of cleaning vapor which penetrates completely through the bearing and out the far end for thorough cleaning.

Diesel Wheel Set Work

New diesel axles for turning are handled into the shop from the outdoor axle rack by the monorail from which they are transferred by the 20-ft. jib crane to the 40-in. American lathe for turning. After turning, the axles are returned to the monorail system by the jib crane for movement down the east-west stem to the branch B which delivers the axle to the storage rack that serves the 120-in. Landis gap grinder. After grinding, this branch of the monorail returns the diesel axle to the storage rack where it is picked up by the fork lift truck and carried to the mounting press storage area.

Diesel axles with the traction gear in place are brought into the shop by lift truck rather than by the monorail which handled freight and passenger car axles. The fork lift truck is felt to be safer than carrying the axle overhead by a rope, and a chain might scratch the axle.

Every diesel axle that comes into the shop—new or secondhand, and whether wheels are removed or not—is checked for maximum throw of .030 in. on the 40-in. lathe; this is a general purpose machine, but it is used

TABLE 3—BREAKDOWN OF A TYPICAL MONTH'S PRODUCTION

	New	Second-hand*
Freight car.....	115	800
Passenger car roller bearing.....	10	60
Diesel roller bearing.....	12	80
Passenger car solid bearing.....	40	110
Diesel switcher solid bearing.....	8	48
Totals.....	185	1,098
Grand Total.....		1,283

*New or secondhand wheels on secondhand axles.

primarily for checking throw, turning roller bearing axles and boring out the ends of axles to apply spline drives for wheel slip control. For the latter operation, the shop built a yoke which supports the free end of the axle on rollers.

Diesel wheels and traction gears are pressed off on the demounting press and pressed on by the wheel press. The mounting press has been modified for pressing traction gears on, the demounting press for removing the gear from the axle. These modifications have been made recently.

Originally the gears were pressed both on and off with the 800-ton wheel press. This meant that a diesel axle with gear, after removal of wheels, had to be carried by fork lift truck from the demounting press east of the shop to the mounting press in the west end, the yoke attachments removed from this press, the gear pressed off, and the axle carried back to the 40-in. lathe or to the scrap axle rack. With the demounting press modified to remove the gear, the axle (without the gear) is picked up by the monorail and carried directly to the 40-in. lathe or to the scrap axle rack.

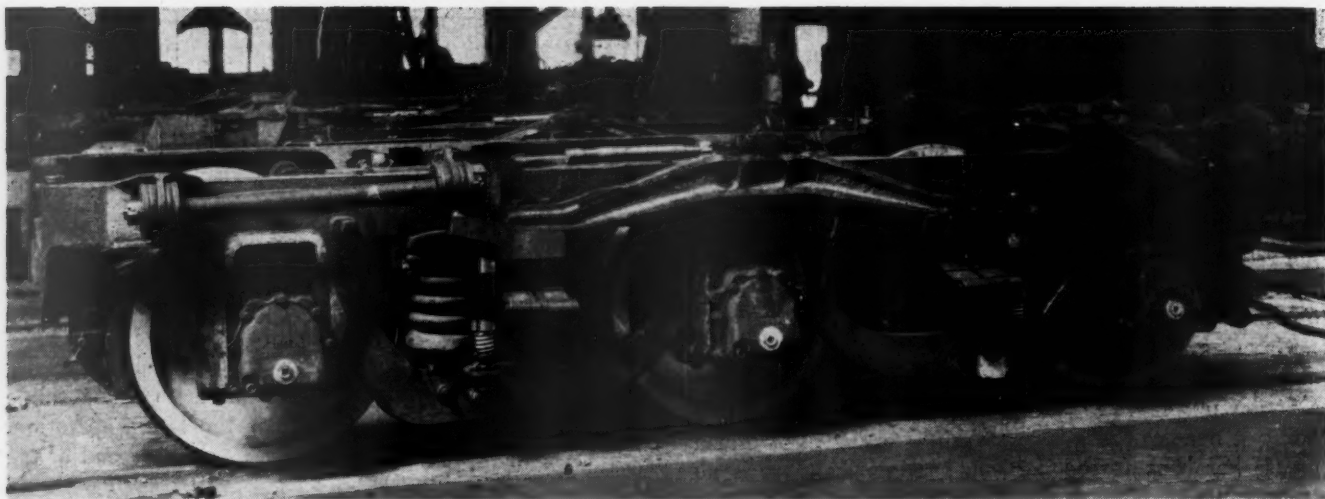
The modification also permits pressing off passenger car wheels mounted on Spicer drive axles without removal of the drive. It consists of two resistance posts, one of which has a pocket for an insert for removing the diesel gear. A second pocket and insert handle the Spicer drive on passenger car wheel sets.

For pressing gears on, two yoke extensions are placed on the resistance post of the mounting press yoke and the gear pressed on the axle which is supported by two cloth-covered hooks. The yoke extensions are removed for mounting the wheels.

Diesel wheels, as well as all other steel wheels, are bored on the 48-in. Niles mill, the 52-in. Betts mill handling the chilled cast wheels. The complete machining operation is done in two steps—boring, then removing the wheel to turn it over to face the hub.

This procedure will be changed in the near future when a third boring mill is installed west of the wheel rack. This is an existing Betts machine a little over ten years old to which has been added a new Consolidated table with an automatic chuck and facing feed.

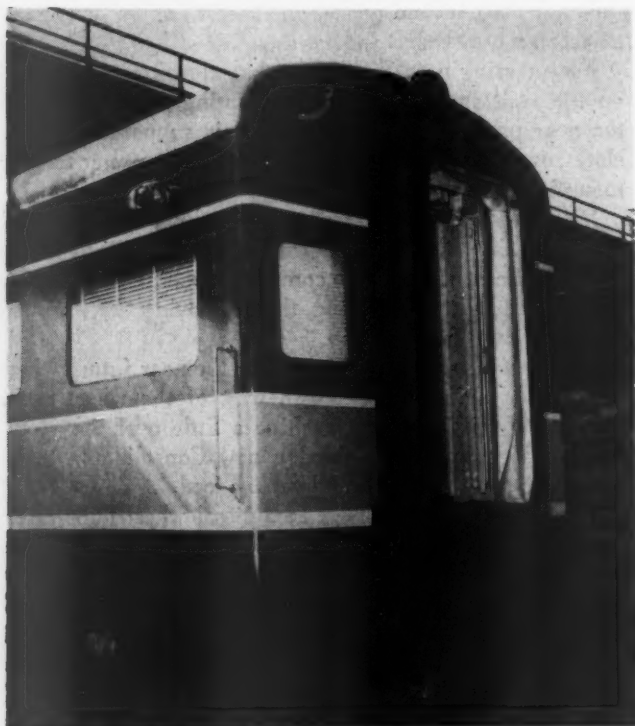
The mill to be added will face diesel wheel hubs after the wheel has been bored on the present machine. The two principal reasons for adding this third mill are: (1) it will face the hub automatically instead of by hand as at present; and (2) it will increase the now limited steel wheel boring capacity, all of which is done on the one mill currently used for steel wheels. No additional work steps will be required as the wheel already has to be removed from the boring mill to be turned over for facing.



The six-wheel trucks were thoroughly cleaned and modernized by applying bolster anchors, friction snubbers and roller bearings.

IC Passenger Cars Modernized at Burnside Shops

IN the last eight years, the Illinois Central has thoroughly modernized between 75 and 80 passenger cars at the Burnside (Chicago) shops. Typical of the work done on these cars is that illustrated in Cars 3308 and 3309



The two modernized I.C. club-observation cars are square-end construction.

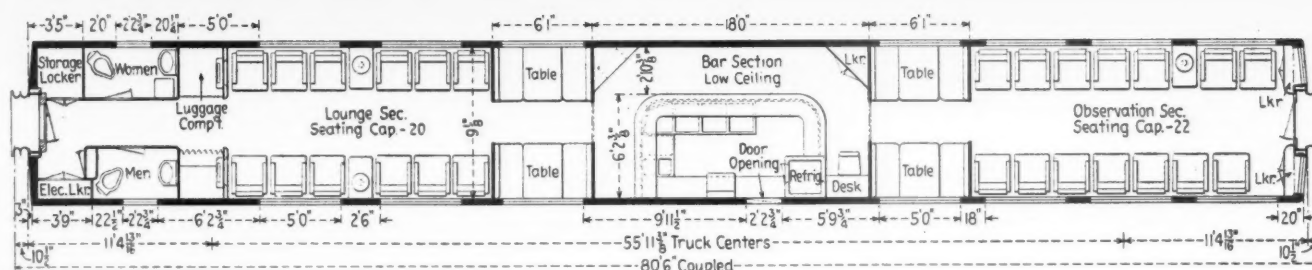
which are classed as club-observation cars and have square ends to permit use for lounge-car service at any location in the train, as desired.

These all-purpose lounge cars, 80½ ft. long, were reconstructed at Burnside shops from non-air-conditioned coaches with sound fishbelly underframes and cast steel platforms which could be modified for the application of Type-H tightlock couplers and Waughmat Twin-Cushion draft gears. The cars were stripped to the underframes, new sides, arched roofs and floors applied and the ends fitted to conform to A.A.R. strength requirements, using copper-bearing steel in an all-welded construction.

Floor supports were spaced to accommodate underneath equipment. Chan-Arch floors are applied in conjunction with composition flooring material, the floor insulation being glass-fiber blankets. The side-wall construction utilizes 4-in. rolled steel channel posts, instead of angle-iron posts and furring strips which required more hand fitting. The end framing includes two 10-in. 25.4-lb. main I-beam end posts, with intermediate posts made of 6-in. 12-lb. ship channels. Extra gussets are applied to stiffen the end sill and platform connection for collision protection. The telescoping plate is a built-up construction of 3-in. angles welded to ¾-in. plate.

Window spacing was changed from 2-ft. 4½-in. wide windows and 11-in. pier panels to 5-ft. wide windows with 18-in. pier panels in the rebuilt cars. The A.A.R. contour roof was applied over pressed carlines.

Six-wheel trucks, of the double bolster type with bottom equalizers, elliptic bolster springs and coil equalizer springs, were originally equipped with plain journal



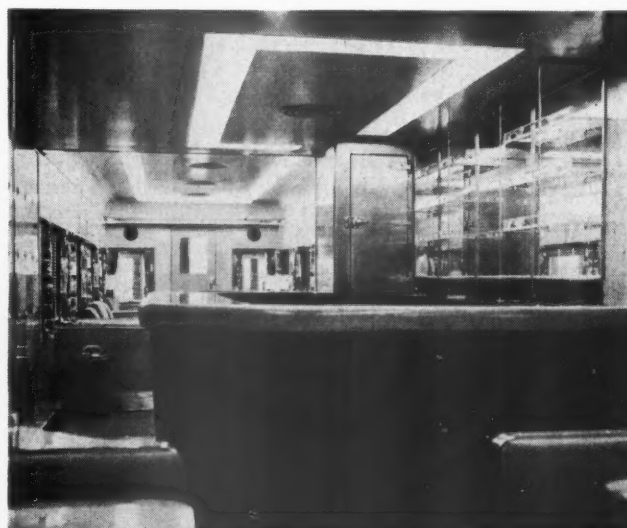
Floor plan of club-observation Car 3309 (above left) modernized at Burnside shops. Car 3308 (above right) has essentially the same floor plan.

bearings and clasp brakes, also body-hung brake cylinders and brake rigging designed for conventional braking of 90 per cent in full service and 112 per cent in emergency. These trucks were completely dismantled, cleaned, checked for squareness and re-assembled with grease-lubricated roller bearings applied to special 5½-in. by 10-in. axles with 5-in. by 9-in. centers. The steel wheels are machined with cylindrical treads.

Other changes in the truck frames included the application of brackets for brake cylinders and slack adjusters, also brackets for the brake lever fulcrums. The corners of the truck frame were thus reinforced at the brake cylinder location to give added strength. With these truck-mounted brake cylinders, the braking equipment is designed for 187 per cent at full service and 250 per cent in emergency at high speed.

Lighting and Air Conditioning

Electric power for lighting and other purposes in Car 3308, exclusive of air conditioning, is supplied by a Safety 10-kw. bodyhung generator with Spicer mechanical drive. A Safety motor alternator takes the 64-volt d.c. power and delivers it as 120-volt a.c. for use in the fluorescent lights. Air conditioning is supplied by a Waukesha Model-D ice engine of 8 tons capacity, Frigid-aire overhead air-conditioning units, air filters and Dorex deodorizer panels. In general, the conditioned air is delivered through a center ceiling duct and Anemostat diffusers. The latest type Vapor air conditioning and thermostat controls are installed. Floor heat is supplied



Teakwood Micarta finish in bar section of Car 3308.

through Vapor fin-type radiation with Zone control. Lighting and air conditioning in Car 3309 is the same as 3308 except that power for lighting and air conditioning is supplied by a Safety 25-kw. electro-mechanical system.

Decorative Treatment

The principal difference between Cars 3308 and 3309 as regards decorative treatment is the use of Formica finish in the latter with light transparencies at the lounge

end, as compared with checker board design Micarta finish with shadow box murals in the lounge end of Car 3308.

The lounge section of Car 3308, 24 ft. 8 in. long, seats 20, including the stationary card section. Decorative treatment features Korina Micarta throughout in grains running horizontal and vertical. A block pattern in horizontal and vertical grains and a full color shadow box lithograph enhances the interest of the bulkhead treatment. Pier panels are featured by clear white mirrorflex in 2-in. squares and the gray mottled carpeting harmonizes with the light gray ceiling color.

The bar section, 14 ft. 5 in. long, with a Teakwood Micarta bar front and a maroon Micarta top, encloses the stainless steel bar equipment and back bar facilities, the latter being made especially colorful by gold plate mirrors and amber lucite display shelves. The walls are covered by Korina Micarta with the vertical rim of the grain in a block pattern. The floor covering is Goodyear 322-S brown field in a cream border, to match the medium tan ceiling color.

The observation lounge, 26 ft. long, seats 20, including the stationary card section. The decorative treatment also

features Korina Micarta throughout, with the grain running vertical on friezeboard, bulkhead, end wall and cabinets. Wainscoat grain runs horizontal and pier panels are treated with gold plate mirrors. The end wall is unique in its treatment of rear windows above the low cabinets provided for the train back-up facilities. Turquoise leaf pattern carpeting harmonizes with the light blue ceiling color.

The Adams & Westlake large double-glazed breather windows are accentuated by light yellow Da-lite control blinds, Korina Micarta window capping, table tops and the draperies in colors to match the Velpoint gray and turquoise sea covering on the unique designed aluminum frame lounge chairs.

By way of comparison the observation lounge of Car 3309 is 26 ft. long and seats 22. The decorative treatment features Red Gum Realwood Formica finish throughout. The brown leaf pattern carpeting harmonizes with the medium beige ceiling color. The double-glazed window sash are accentuated by satin aluminum cable curtain fixtures, red gum Formica window capping and table tops. Drapes in horizontal colors, blend with the trimpoint green, brown and tan seat covering.

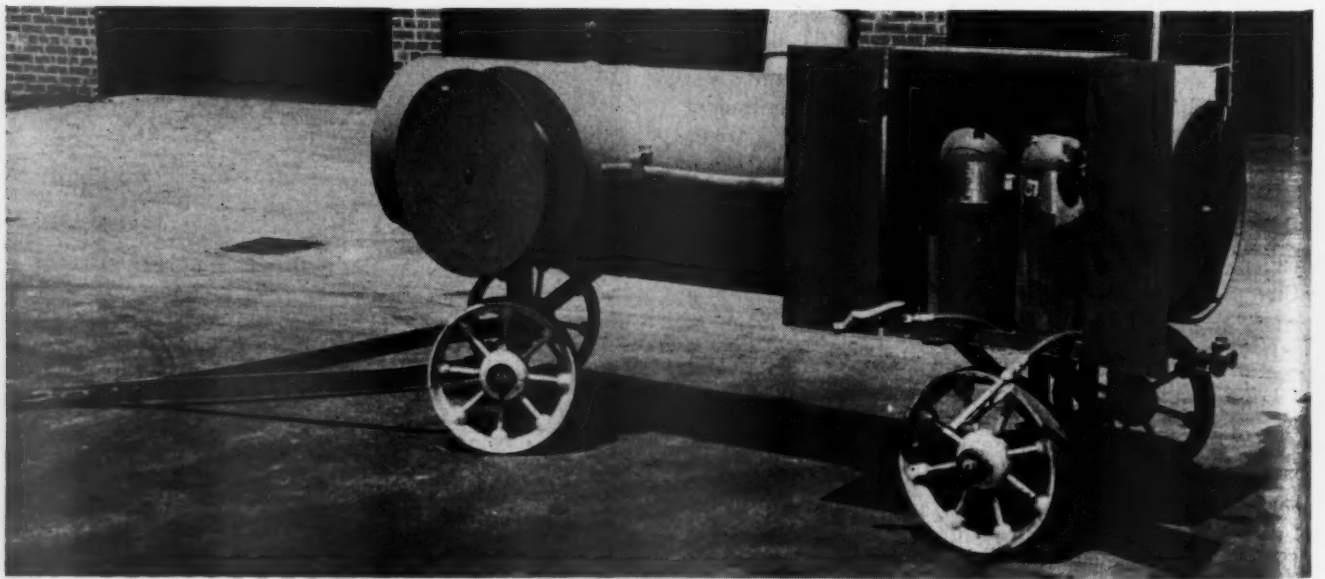
■ ■ ■

Rip Track Fire Fighting Wagon

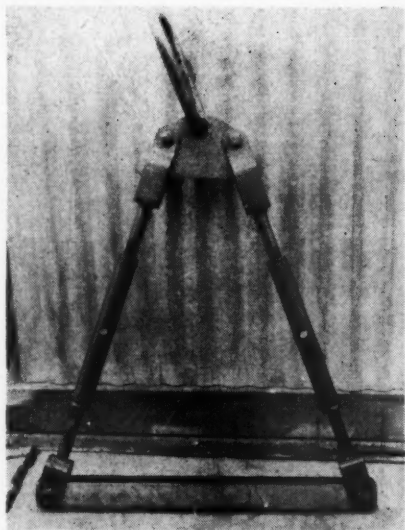
To protect its rip track area at Springfield, Mo., by putting out small fires quickly before they become big ones, the Frisco has built a four-wheel fire fighting wagon which can be pulled along the concrete runway either by the

workmen or by a shop truck. It extinguishes the blaze either by fog nozzles or by dry extinguishers.

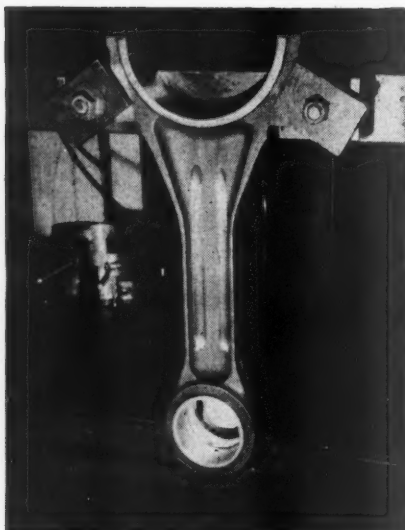
The wagon carries 275 gal. of water (a seven-minute supply), two CO₂ dry extinguishers, two axes, and two reels, each with 50 ft. of 1-in. hose. It is charged with air for water delivery from one of the rip track outlets. Anti-freeze (calcium chloride or similar solution) is added to the water during the winter to permit storage outdoors.



Fire-fighting wagon used on the Frisco's rip track at Springfield, Mo.



Blower lifter with turnbuckle sides.



Light bulb mounting for wrist-pin-bushing inspection.



This portable device sands a locomotive in 15-20 min.

Miscellaneous Diesel Shop Ideas

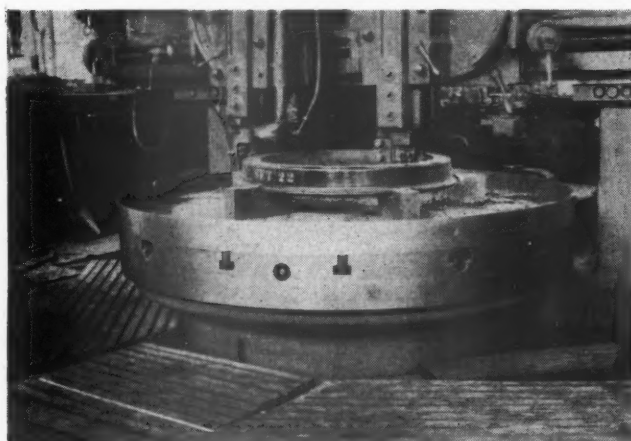
Some handy ideas on diesel maintenance found in various diesel shops are shown in the accompanying illustrations. One is a blower lifter, the sides of which are composed of turnbuckles which can be used either to keep the blower straight or to hold it at any angle desired. Another road has mounted an ordinary light bulb on a bench for inspecting the oil grooves on piston pin bushings. The bulb is mounted just over the support for the wrist pin end of the rod when the rod is secured in place by the quick-clamping arrangement at the crankshaft bearing end.

Another road has developed a set of five special jaws for use on a boring mill which permits simultaneous boring and turning of tires from 36 in. to 72 in. The jaws clamp the wheel on the crown of the flange through cam action. Carbide tools are used for both the bore and the tread at a cutting speed of 175 to 250 ft. per min. The boring cut is about $\frac{1}{4}$ in. deep, the tread cut a clean-up cut only, while the feed for both is $\frac{1}{32}$ in.

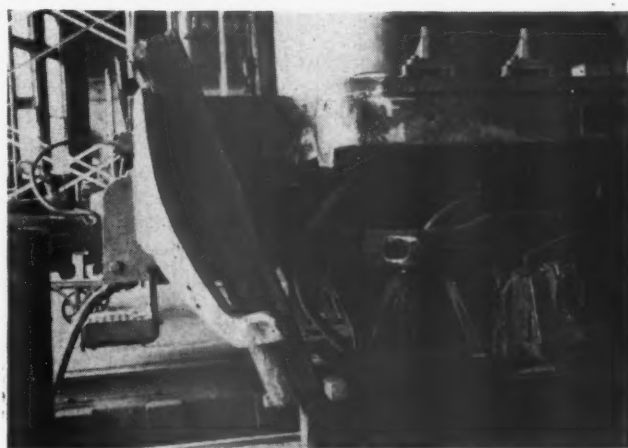
Another road has found that the easiest way to straighten bent end plates on diesel switchers is to cut out with a torch the section that is bent, straighten it on a steam hammer, and then weld it back in place. This procedure has been found to cost only about half as much as straightening the end plate in place, and it eliminates bending adjacent areas.

Another device that has proven a time saver is a portable sander which is used to sand switchers whose working location is a lengthy trip from the regular sanding facilities. This portable device sands a locomotive in 15 to 20 minutes and can be easily moved by two men. It connects to the train line for a source of dry air pressure, operating at 12 to 15 p.s.i., as controlled by a feed valve. A check valve between the air inlet and the gage keeps the sand out of the feed valve and the gage

line. Shut-off valves are incorporated at the tank outlet to shut off the sand after filling the locomotive, and at the end of the delivery line to prevent sand falling out.



Jaws to bore and turn tire at the same time.



A steam hammer will be used to straighten this bent end plate.

ELECTRICAL SECTION



Fig. 1—The heat is not severe enough for operator to wear gloves

I BELIEVE everybody having anything to do with the rewinding of traction motors has tried in many ways to find a satisfactory means of removing coil ends from commutator risers. The objective is to heat the solder

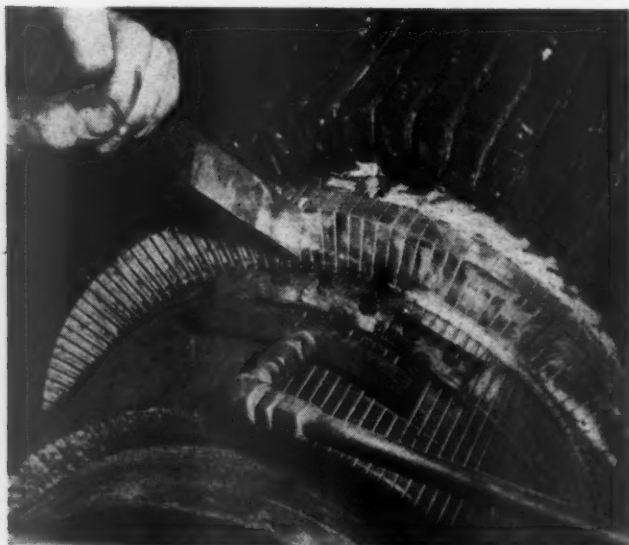


Fig. 2—The tip is bent to conform to the radius of the commutator

Removing Coil Ends From Commutator Risers

*By C. F. Steinbrink
General Electrical Foreman*

to a plastic state so that the lead or strap of the armature coil left in the riser can be driven out without destroying the mica between the riser and still leave the solder soft or plastic enough that it may be scraped off and leave the tinning on the riser.

There just did not seem to be any satisfactory answer until the high frequency heating machine was introduced. This was developed primarily for soldering the commutator or coil leads in the riser and later adopted by one manufacturer for removing the strap from the riser, but the price of this machine was too high for adoption by the individual railroad. Therefore, for ten years, I believe, at least as many ideas were used as there were shops and men in these shops. We tried 40 or 50 different methods over a period of many years, and discarded all of them as unsatisfactory. We burned the mica, punished the risers by bending them back and forth to get working clearance for reamers and motor-driven flexible discs, and did many other things which now seem ridiculous.

We tried every tip that the acetylene and oxygen people manufactured. We made special tips, special regulators, used special gases, electric irons, gas irons, open flames, preheated commutators, etc. In fact, I think we spent more time and did more experimenting to find a solution of this problem than any one we had, and like every other problem, the solution was very simple.

Fig. 3—The exact position of the tip is important for good operation



This particular problem was solved with the aid of the Air Reduction Company, by the use of flat descaling tips. They can be adapted to various lengths as the burners are made of 2-in. sections, and on traction motors, to date, we have used three tips.

Figure 2 shows how the tip is bent to conform to the radius of the commutator. A wedge is used to drive or push out the coil strap and no pressure or solid blows are necessary. A light tap of a small hammer is all that is needed. This is very important, for anything that will distort the commutator must be avoided, or commutator seasoning will become more difficult.

Figure 1 demonstrates the position and size of flame. It also shows that the heat is not severe enough to even make it necessary for the operator to wear gloves, or otherwise be protected from the heat or flame. The only precaution needed is the use of safety goggles as the solder sometimes splatters. It is also necessary to have several wedges or driving tools as they will become uncomfortably hot after being used for a while.

Figure 3 shows a close-up of the position of the tip and its relation to the commutator. The answer to correct heat was the use of acetylene and shop air in place of oxygen, as the oxygen flame was too hot. It takes approximately two minutes to heat the first riser hot enough to remove the straps and after five or six straps are removed, the armature is rotated out of the path of the flame and a flat piece of steel, $\frac{1}{16}$ in. thick, is drawn across both sides of the riser to remove the excess solder. Usually, the removing of the equalizer is all that is necessary, but it is our practice on the risers which have different milling for the equalizer, to make a visual inspection, and to use a file to clean out any excess solder that is left.

This problem was solved only a short time ago and at the present time we are making a motor-driven attachment that will revolve the motor at approximately 6 in. per minute. It will have foot control for stopping and starting, and for revolving the armature in either direction. This is necessary as different degrees of heat are required for various risers even on the same commutator.

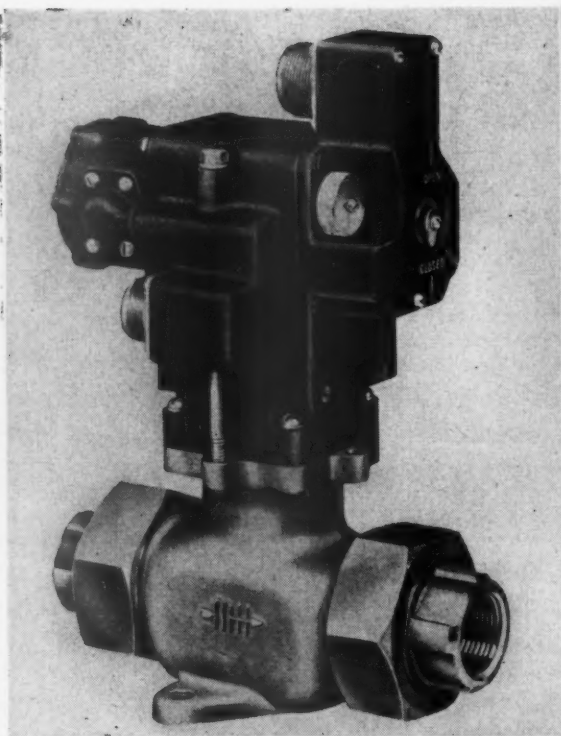
The descaling tip we are using is Airco 120 Flat Descaling tip assembly, size 6-in. Stock No. 811-1206, shown in their catalog No. 2, entitled, "Hand Torches." Other

manufacturers of this type of equipment can also furnish the same tool which can be attached to any welding or heating torch. The torch is fastened to a portable stand. This is not shown in the illustrations, but any support that will allow the necessary adjustment is all that is required.

■ ■ ■



One of the Union Pacific's gas turbine-electric locomotives on its way from the General Electric plant at Erie, Pa., for delivery to the railroad being displayed in Chicago by the Chicago Tribune through the cooperation of the railroad. The new 4,500-hp. unit is one of 25 which the Union Pacific has ordered from the General Electric Company. More than 9,000 persons inspected the locomotive during the four days it was on exhibit. The building in the background is the Tribune Tower.



Left: The Honeywell motorized control valve. When check buttons are pushed, pointer (upper right) moves toward *Open* position to indicate heating is okay, and to *Closed* position to indicate that cooling is operating. Right: Panel enables entire heating-cooling system to be checked in a matter of seconds.

Quick Check for Car Cooling and Heating System

A "PUSH button inspection" panel for railway passenger cars that enables the entire heating-cooling system to be checked in a matter of seconds instead of hours as previously required, has been developed by Minneapolis-Honeywell Regulator Company, Minneapolis, Minn. The panel is designed for use with the company's electronic type control systems.

By pushing two check buttons on the front of the panel, —one for heating and the other for cooling,—maintenance men can easily and quickly determine, before a car is placed in service, whether the entire control system is in operating condition. This includes a check on the electronic bridge circuit, electronic thermostats, electronic relay amplifier and motorized valve.

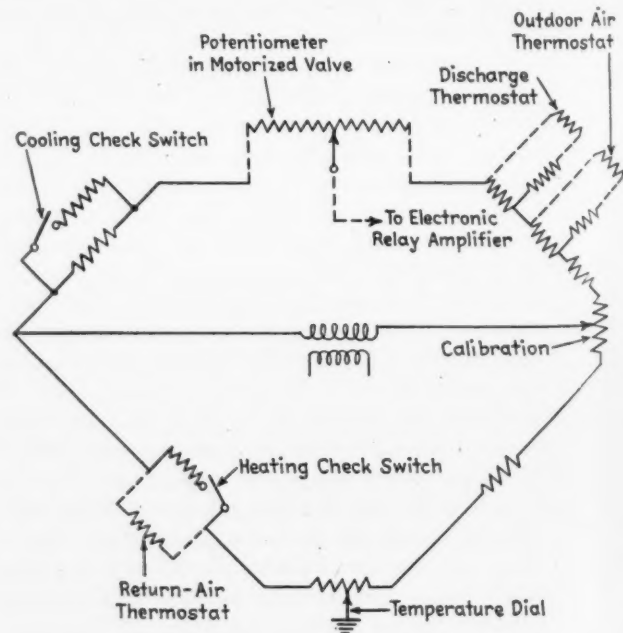
Should any malfunctioning be indicated, the panel enables the trouble to be isolated quickly, thus further reducing maintenance time and expense.

The panel—20 in. long, 14 in. wide and 5 in. deep—is installed in the car's electric locker. The push buttons are single-pole, single-throw normally-open, spring-loaded type and are connected into the bridge circuit along with suitable resistors to give the desired check. When either of the buttons is pushed, it operated the control system's motorized valve which modulates the flow of steam for heating and, with the use of end switches, brings on the first and second stages of refrigeration during cooling. A pointer on this valve operates between an open and a closed marking, thus indicating valve position.

One push button is labeled heating check, and the other,

cooling check. To run a heating check, the operator pushes the heating check button and watches the pointer on the motorized valve to see that it moves toward the opening marking. To check the cooling, the operator pushes the cooling check button and watches the valve to see that it moves toward the closed marking.

Ordinarily, it is not necessary for the operator to wait for the pointer to run to the full open or full closed position. It is only necessary to see that the pointer is moving



Simplified wiring diagram for the railroad air conditioning bridge circuit showing the heating and cooling check switches.

in the right direction. However, if refrigeration equipment is going to be used during the run and the operator wishes to check this equipment, he can push the cooling check button and wait until the valve reaches the fully closed position, at which time both stages of cooling should be on.

The pointer on the valve responds instantaneously when either button is pushed. Failure of the pointer to respond indicates the type of trouble involved. For example, if the pointer does not move toward cooling, this indicates a short circuit in the thermostats or compensator circuit. If it does not move toward heating, an open circuit in the thermostat or compensator circuit is indicated.

The three thermostats in the panel are part of a Wheatstone bridge circuit which is shown on the sketch. The thermostats are simply coils of temperature sensitive wire whose resistance increases with an increase in temperature and vice versa.

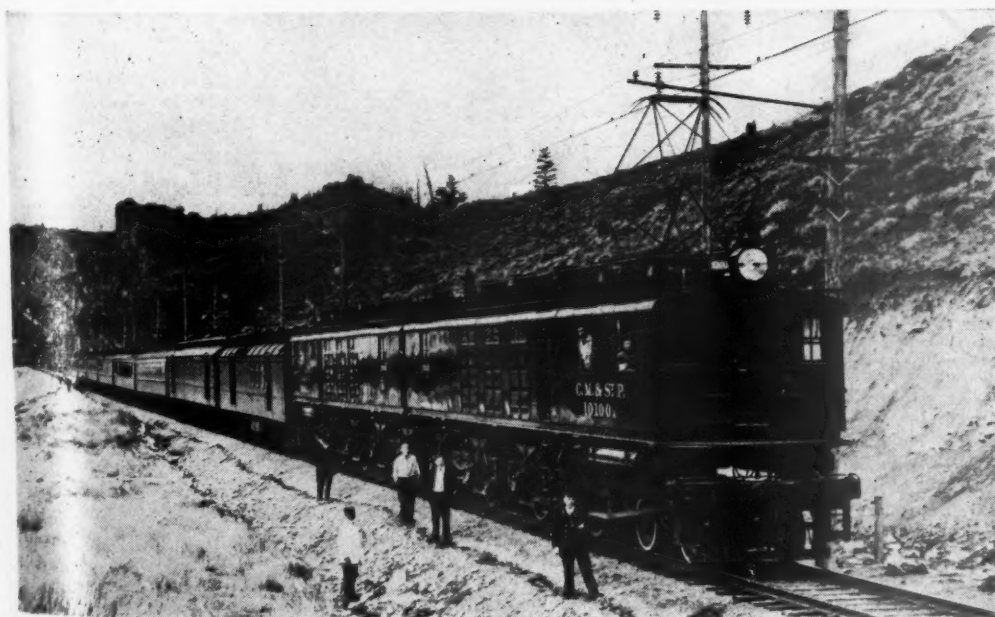
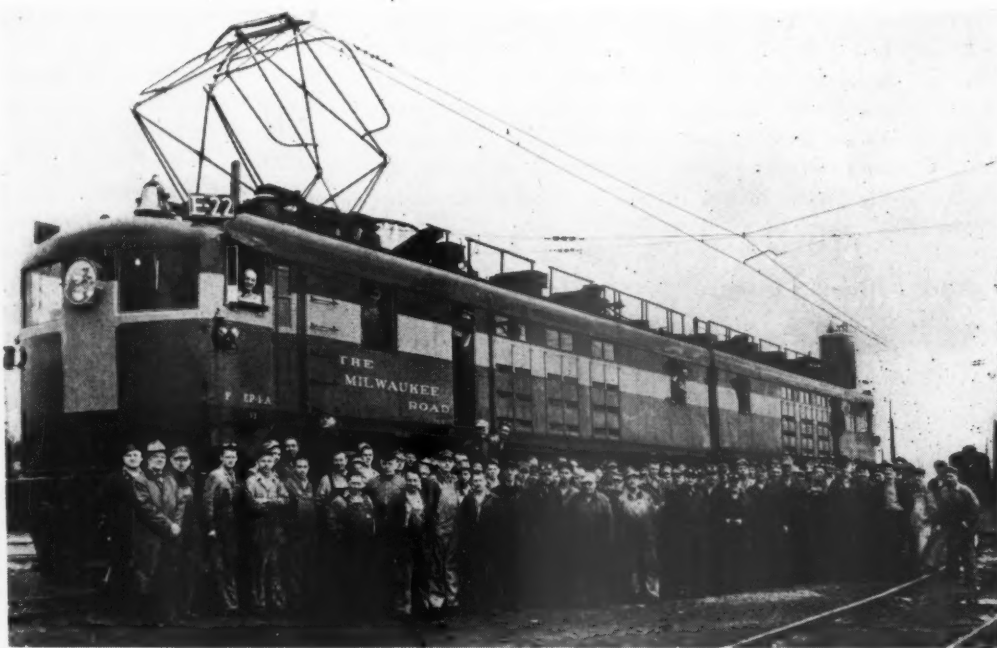
When the temperature at a thermostat decreases, its resistance also decreases. This causes an unbalance in the bridge circuit and a signal is fed to the amplifier. A relay in the amplifier connects power to the valve motor causing the motor to run in a direction to open the valve. At the same time that the motor is opening the valve it operates a wiper on a potentiometer which is also part of the bridge circuit, thus rebalancing the bridge and stopping the motor.

As can be seen from this sketch, the heating and cooling check switches can also unbalance the bridge giving the same effect as a temperature change at a thermostat. The value of resistance in series with the check switches is such that the push buttons cannot unbalance the bridge if a short or an open circuit exists in any of the three thermostat circuits. Therefore, in the case of a short or open circuit, pushing a check button will result in no movement of the valve pointer.

■ ■ ■

Milwaukee Rebuilds 37 Year Old Electrics

The first rebuilt locomotive, now in service on the Rocky Mountain Division between Avery, Idaho and Harlowtown, Mont., is shown with the shop crew which made the conversion. In the lower picture is one of the original locomotives as it looked in 1915.



Four electric freight locomotives, built for the Chicago, Milwaukee, St. Paul & Pacific by the General Electric Company in 1915, have been rebuilt for passenger service in the railroad's Tacoma, Wash. shops. Streamlined and modernized, it is contemplated they will have power and speed comparable to a 4,500-hp. diesel locomotive and can be operated for less than 20 cents per locomotive mile for at least the next four or five years.

DIESEL-ELECTRICS—How to Keep 'Em Rolling

18

The Locomotive Excitation System

Trouble Shooting

You have just seen how the excitation system works. You may say "Good, but how can I tell whether it is working or not?" There are a number of ways to do this. Some are better than others. We'll cover three checks that you can make in a matter of minutes. You can make them without disconnecting any wires. They won't necessarily locate the trouble, but they will tell you if something is wrong with the excitation system. They're like the checks your doctor makes to see if there is anything wrong with you.

Taking "Blood Pressure"

You will need a voltmeter or an analyzer that will read at least 900 volts. Connect it so that it reads main generator voltage. A good place to make these connections is on the stationary tips of the starting contactors *GS1*

* This is Part II of the eighteenth of a series of articles on maintenance of diesel-electric equipment. This article is written by B. L. Judy and A. V. Johansson, both of the Locomotive and Car Equipment Department, General Electric Company, Erie, Pa. Part I appears in the May 1953 issue of *Railway Locomotives and Cars*.

and *GS2*. Now, with the locomotive ready to move, center the reverse handle and advance the throttle to the 8th notch. The generator voltage should build up and you should be able to read it on the meter. This meter is connected to the high side of the generator, so be sure it is sitting on an insulated pad and do not touch it. In early model locomotives the coil circuits of the generator field contactor *GF* and the exciter field relay *EF* are a little different. Because of this you will have to block the generator field contactor closed on these locomotives. You will also have to short out the power contactor interlocks in the *EF* relay coil circuit so that it will pick up. You can see where to do this on the wiring diagram for the particular locomotive you're testing. Be sure not to nullify the ground relay protection when you do this.

The 8th notch voltage reading can be anywhere between 750 and 900 volts, depending on the type of locomotive. The exact voltage reading for the locomotive you are on is given in the instruction book.

If you get an extra high voltage reading, look for an "open" in the voltage limit portion of the circuits that control the exciter-field (*F1-F2*) current. If you get a voltage reading you know that the main generator field

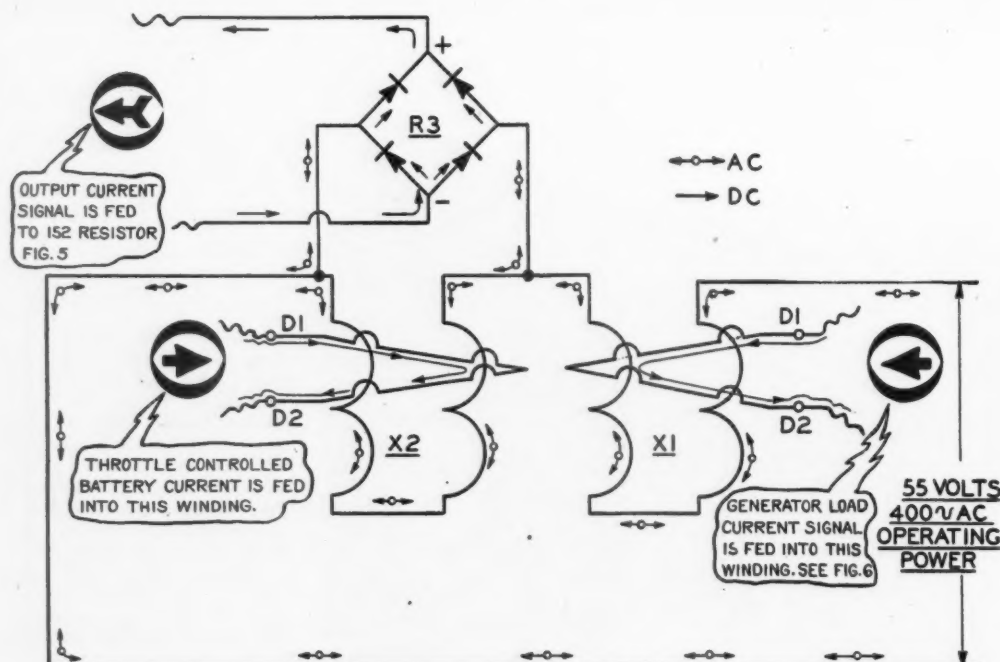


Fig. 7—Reactors and rectifiers are used to deliver the signals to the resistor shown in Fig. 5 which appears in Part I of this article in the May 1953 issue of *Railway Locomotives and Cars*.

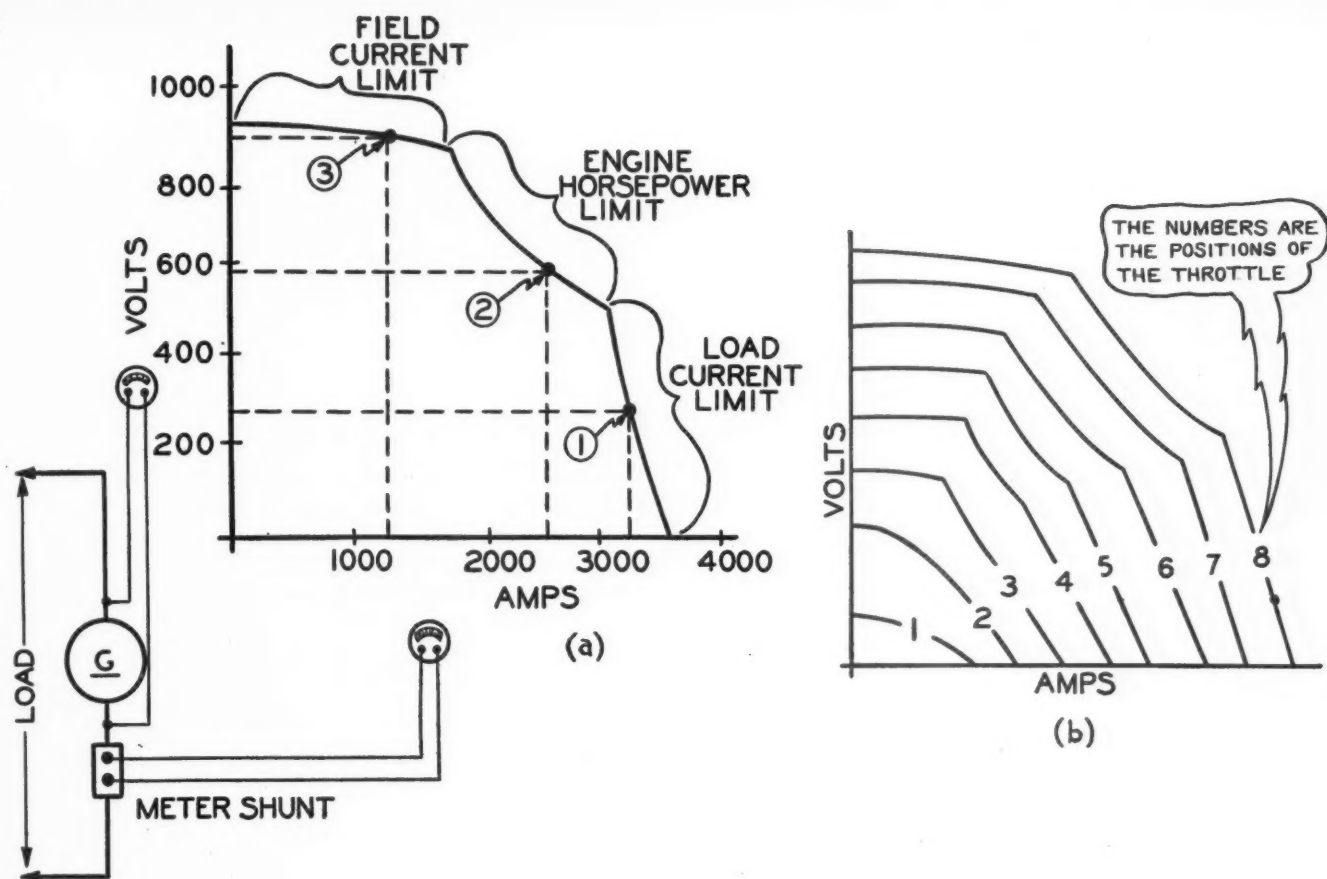


Fig. 8—Generator output curves and how they are obtained

circuit is okay. If you get no voltage reading, check to see that *GF* and *EF* are closed. If they are, then you can be quite sure that something has gone wrong in the excitation system. Go on to the next check.

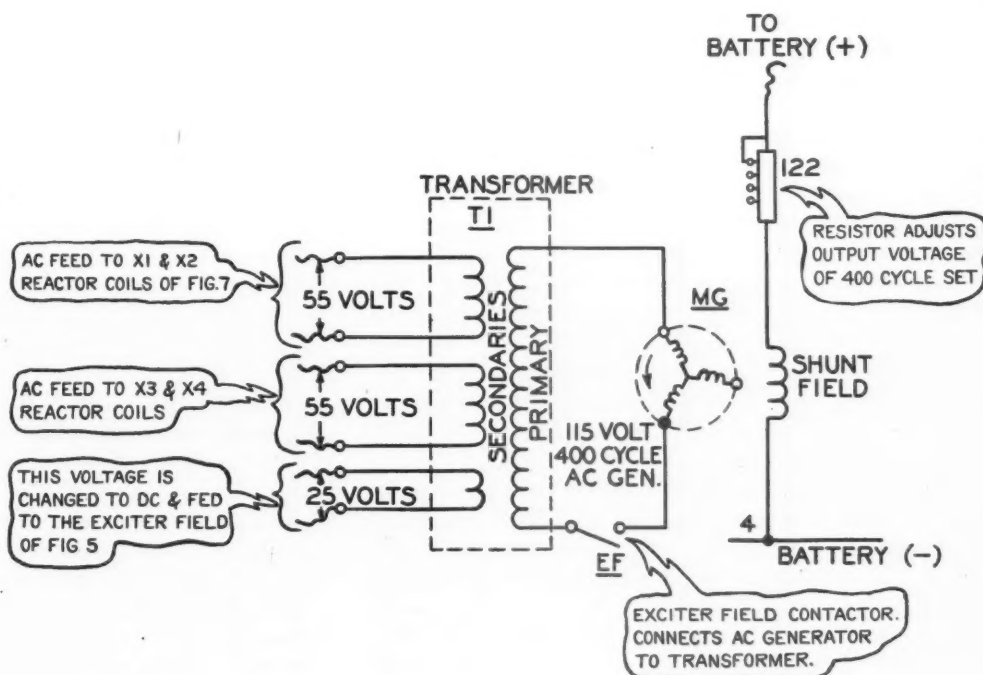
Taking "Temperature"

With the engine running, get the locomotive ready to

move. This includes throwing the reverse handle. Then set the brakes so that it can't move. Advance the throttle to the first notch keeping an eye on the loadmeter. Don't leave the throttle in this position very long or you may damage the traction motor commutators.

If the needle "hits the peg" (moves all the way through the red zone to the stop), there is an "open" somewhere

Fig. 9—Power supply for the excitation system



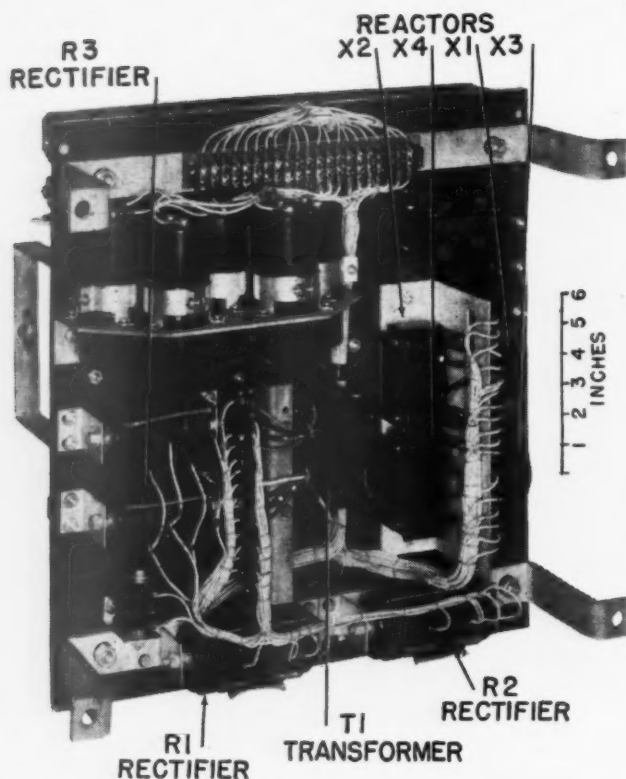


Fig. 10—One type of generator excitation control panel used on diesel-electric locomotives

in the current limit circuits. Quite likely it is in some part of the circuits shown in Fig. 7.

If you don't get any loadmeter reading at all even though you got a voltage reading in, then the generator is not being connected to the motors. Probably a power contactor is not closing. At least you know that the excitation system is working all right.

If you get neither a voltmeter nor a loadmeter reading then the excitation system is not working. Go to the third check.

Taking "Pulse"

You will need a voltmeter or an analyzer with a scale that is good for 5 volts. Connect the meter across the exciter field (F1-F2). Probably the easiest place to do this is at the connection box on the amplidyne. You will have to shut the engine down while you make this check. If it is running, open the fuel pump breaker on the front of the control compartment. The 400-cycle set must be left running though. If the locomotive is in multiple with other units you will have to shut all the engines down while you make the test. If the engines are not running, set up the locomotive as if you were going to move it, but leave the fuel pump breaker open. The bells and buzzers will ring but the test will last only a minute or two. Don't block the safety relay SAR while you are making the test.

With the throttle in notch 1 and the reverse handle in either forward or reverse, read the F1-F2 voltage. Move the throttle up to the 8th notch and again read the voltage. The 8th notch reading should be somewhere around 3 volts, and about three times the first notch reading. Most of this change will take place in the first 4 notches. If there is no voltage see that the load control

brush arm on the governor is clean and that it is making good contact. If this is okay then there is an "open" in the feed to the field. We'll take a look at this circuit in a minute.

If the 8th notch voltage is normal but only about twice the first notch voltage, the 120 resistor or its circuits, Fig. 5, may be open. If there is little or no change in the voltage as you advance the throttle, look for an "open" in the X1 or X2 reactor circuits or the current limit notching resistor.

With a little practice you will be able to find most excitation troubles by this F1-F2 voltage reading.

Let's Look at the Limits Another Way

Figure 8 is a chart showing the limits that we have talked about. Let's look at the different lines and see what they show.

To get the readings for drawing the curve in Fig. 8 (a), we have to connect the generator to a load. On the road you can get the readings by connecting up the meters as shown and letting the traction motors be the load. In the shop you use a load resistor or water box. Note that the voltmeter reads generator volts and that the ammeter reads load current.

Suppose you are starting a train. At first, the traction motors will draw a heavy current but the voltage will be low. Point 1, Fig. 8 (a), shows where such a reading would be located on the curve sheet. The amp. reading is about 3,200 and the volt reading is a little less than 300. Both these readings must be taken at the same time. If you take a couple of readings at the very low speeds and put the points on the curve sheet you can draw the load current limit line. This line shows the most current that the motors can draw in the eighth notch. The engine will not be putting out full horsepower at this point though.

As the train picks up speed, the current reading will go down and the voltage will go up. After a while, a point is reached where the engine is putting out full horsepower. Point (2) shows one of the readings on the horsepower curve. The readings is 2,500 amp. and a little less than 600 volts. If you get readings at two or three speeds in this region you will be able to draw this part of the curve. You can always tell when you are in this part of the curve by looking at the load control brush arm on the governor. It will be over in the active section of the rheostat.

As the locomotive continues to speed up, a point will be reached where the generator voltage will be quite high. You can get this at rather low speeds with the selector handle in position 1 or by otherwise preventing transition. You can tell when you are in this part of the curve by again looking at the load control brush arm. It will be back in the inactive section of the rheostat. This means that again full horsepower is not being demanded from the engine. Point (3) shows one of the voltage limit readings. Notice that the current is now small, 1,200 amp. and that the voltage is quite large, 850 volts.

Figure 8 (b) shows the curves for all 8 notches. These curves show how current, horsepower and voltage change in steps as the throttle is moved from notch to notch. Both of these sketches are very helpful in understanding how the diesel engine, the traction generator and the traction motors are made to work together as a team.

The Excitation System Power Supply

In Fig. 9, you see the generator often called "the 400 cycle set" that supplies excitation power. Alternating current at 400 cycles is used to keep the size of the parts down. The generator is driven by a 74-volt, d.c. motor. The 115-volt generator output is fed to the transformer primary. The transformer has three secondary windings. These windings supply all of the power for the exciter field and its control circuits. This does away with the bad effects of voltage variations because the exciter field and its controls vary together.

If you find that there is no exciter field voltage, see that the 400-cycle set is running—the 172 MG set breaker may be turned off or tripped. If the set is running take a look at the exciter field relay EF. See that it is picked up and that its contacts are not dirty or fouled. The a.c. voltage from the 400-cycle set is picked up by brushes

and slip rings. These are much like the brushes and commutators on d.c. machines. If you aren't getting any voltage out of the 400-cycle set the trouble may be with the brushes or slip rings. The power that is handled in this set and in the transformer is very small, so you aren't likely to have troubles from overheating.

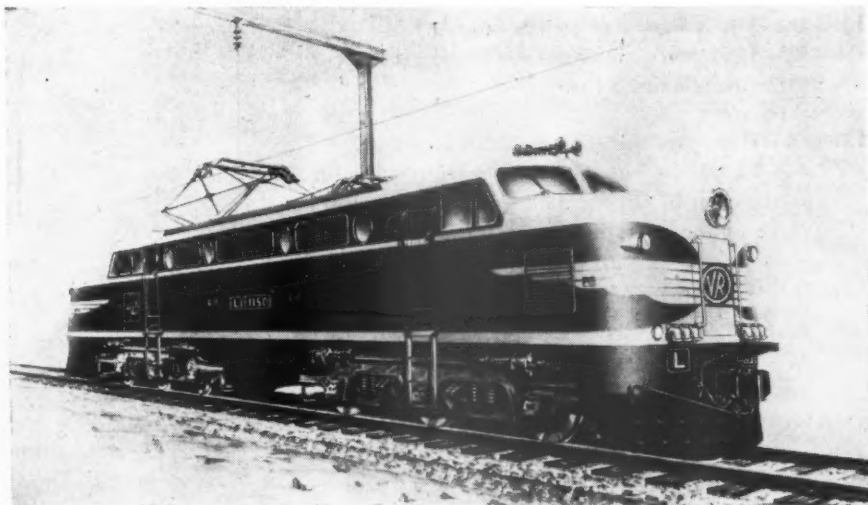
Get What You Pay For

Each one of us wants to get his money's worth. The railroads are no exception. When they buy diesel-electric locomotives they want to get all the horsepower they pay for. Yet a faulty excitation system can cut down the power of a locomotive without being suspected. The explanation and tips given here will help the maintainer to spot the trouble. With a little practice he will find it easy to get all the available horsepower where it is needed—at the drawbar.

■ ■ ■

All-Service Electrics for Australia

One of the Victoria Railway Class L electric locomotives



The first two of 25 mainline electric locomotives, built for the Victorian Railways, Australia, reached Melbourne from England in January. The remainder are being shipped at the rate of one a month for the first three months and two a month thereafter. The locomotives, English Electric Company products, have been designed for use on the Gippsland line when electrification is complete between Dandenong and Traralgon, a distance of 79 miles. Each locomotive is 59 ft. long over coupler centers and has a wheelbase of 46 ft. 4 in. It weighs 96 tons in running order. Minimum and maximum operating heights of the pantograph from rail are 14 ft. 4 in. and 21 ft. respectively. Axle bearings are Timken inclined roller type. Like the diesel-electric locomotive now in service on the Victorian Railways, electric locomotive has a driving compartment at each end.

The power circuits are supplied direct from the 1,500-volt contact wire by either of two pantographs. There are 36 notches on the controller including 12 running notches. Eight notches of dynamic braking are available. The air braking and dynamic braking are interlocked to provide various braking arrangements.

The locomotives have two, six-wheel trucks. The motors are axle-hung and nose-suspended from the truck frames. They drive the axles through resilient spur gears mounted on the axles. Wheels are 40 in. in diameter. At each end ventilating air is carried by ducts which connect the blower with its three motors.

Designed for both passenger and freight service, the locomotives have a one-hour rating of 2,400 hp. They will have blue and gold livery similar to that of the Victorian Railways' diesel-electric locomotives. Maximum tractive force is 47,000 lb., and, in passenger service, they are capable of speeds up to 75 m.p.h. In freight service, they can haul 1,100 trailing tons up a .9 per cent grade at 30 m.p.h.

The Gippsland line, on which the locomotives will be used, links Melbourne, the capital of Victoria, with Yallourn, where there are large deposits of good quality brown coal, large tonnages of which are brought to Melbourne for industry. The 1,500-volt d.c. contact system is supplied by pumpless steel tank mercury arc rectifiers in 16 substations. Power to the substations is supplied at 22,000 volts, 3-phase, 60 cycles.

Questions and Answers

Schedule 24 RL Air Brakes

TWO PNEUMATIC SWITCHES—FIG. 7

1591-Q.—To what are the two pneumatic switches connected?

A.—One switch is connected to the straight air pipe and the other switch is connected to the control pipe (11).

1592-Q.—How does the first switch function?

A.—During an electro-pneumatic brake application, it functions to cut the battery current to the coding circuits and the Wheatstone bridge of the circuit checking equipment.

1593-Q.—When does this switch operate?

A.—It is set to operate when the straight air pipe pressure reaches 3 lbs.

1594-Q.—How does the second switch function?

A.—Functions during an electro-pneumatic brake application to cut the battery current to the magnet valve or the overspeed magnet valve.

1595-Q.—What action takes place when the parallel contacts in the relay cabinet are opened due to a circuit fault?

A.—The closed pneumatic switch contacts serve to nullify the action of the relay cabinet contacts until an electro-pneumatic brake application is made.

1596-Q.—What then will be the result.

A.—This will result in opening the contacts of the pneumatic switch and cut the circuit to the magnet valve.

1597-Q.—When the circuit to the magnet valve is cut, what takes place.

A.—This causes a full service brake application.

FA-4 MAGNET VALVE

1598-Q.—For what reason is an FA-4 magnet valve required.

A.—The FA-4 magnet valve, Fig. 8, is required with the SC-2A circuit checking equipment where the overspeed details do not include an overspeed magnet without a time delay.

1599-Q.—Why should this magnet valve be included in nearly all installations?

A.—General railroad practice is to include a time delay in the overspeed feature and therefore the FA-4 magnet valve should be included in nearly all installations.

1600-Q.—What is this valve used for?

A.—To initiate the brake application automatically

if a circuit fault occurs during an electro-pneumatic brake application or, if an electro-pneumatic brake application is attempted after a circuit fault is indicated.

1601-Q.—What is the Circuit-Breaking Switch?

A.—A line switch to control the current supply to the FA-4 Magnet Valve when used.

1602-Q.—Why is a $\frac{3}{8}$ inch cut-out cock required?

A.—Located ahead of the magnet valve, it is used to cut out the circuit checking equipment and de-energize the magnet.

PRINCIPLES OF OPERATION

1603-Q.—What is used as the basis for the operation of the SC-2-A circuit checking equipment?

A.—The well-known Wheatstone Bridge.

1604-Q.—What is accomplished by means of this system?

A.—By means of this system the resistance of the magnet valve is compared to the resistance of a calibrated rheostat.

1605-Q.—How many Wheatstone bridges are used with this installation?

A.—Two.

1606-Q.—For what reason are two bridges used?

A.—One is for the application circuit and the other for the release circuit.

1607-Q.—What term may be used for this part of the SC-2-A Circuit Checking Equipment?

A.—This can be considered as the "resistance measuring" part of the equipment.

1608-Q.—Referring to Plate 1, what comprises the upper and lower arms at the left of the figure?

A.—Two fixed resistors.

1609-Q.—What two kinds of resistances are involved?

A.—Unknown resistance and known variable resistance.

1610-Q.—What comprises the unknown resistance?

A.—The magnet valves are substituted for the usual unknown resistance and are shown in the lower right arm of the bridge.

1611-Q.—What does the known variable resistance consist of?

A.—A rheostat calibrated in number of vehicles.

1612-Q.—Once the number of vehicles is known, what can be done?

A.—Once the number of vehicles in the train is known, the bridge may be balanced to show zero current in the detector relay Y.

G. E. RECOMMENDS 3 CABLES FOR REWIRING DIESEL-ELECTRIC LOCOMOTIVES



For all traction-motor leads

General Electric recommends G-E Versatol* Geoprene cable, SI-58220, for all traction-motor leads, on all makes and types of diesel-electric locomotives. A reinforcing braid binds the insulation to the jacket and makes this cable better able to take the continual flexing caused by the movement of the trucks. The neoprene-base jacket has the toughness necessary to stand up under the cutting action of flying dust, grit, and sand, and to resist oils, water, cleaning compounds, steam, and ice.

*Registered Trade-mark General Electric Company

For more information on General Electric cables for rewiring diesel-electric locomotives, write to Section W77-747, Construction Materials Division, General Electric Company, Bridgeport 2, Connecticut.



For all power circuits

General Electric recommends G-E Versatol* Geoprene cable, SI-58219, for all power circuits, except exposed traction-motor leads, on all makes and types of diesel-electric locomotives. This cable is constructed to meet the predetermined diameters required for diesel-electric locomotive applications. The conductor has an extra-flexible rope stranding to help give maximum life where vibration is present. The insulation is particularly outstanding where heat is present. And the neoprene-based compound used for the jacket makes a tough, smooth surface that stands up under abrasion, makes pulling into conduit easy, and has good resistance to such corrosives as fuel and lubricating oils, steam, and cleaning compounds.



For all control circuits

General Electric recommends G-E Geoprene locomotive control wire, SI-58222, for all control circuits, on all makes and types of diesel-electric locomotives. This cable withstands vibration, is easy to weave and to pull. The conductor is extremely flexible, being made up of as many as 65 individual strands. Individual strands are tinned for better stripping and easier application of terminals. The over-all diameter is small and provides ample insulation for low-voltage circuits. It is highly resistant to fuel and lubricating oils, and most acids and alkalis.

You can put your confidence in—

GENERAL  ELECTRIC



Diesel-Electric Locomotives*

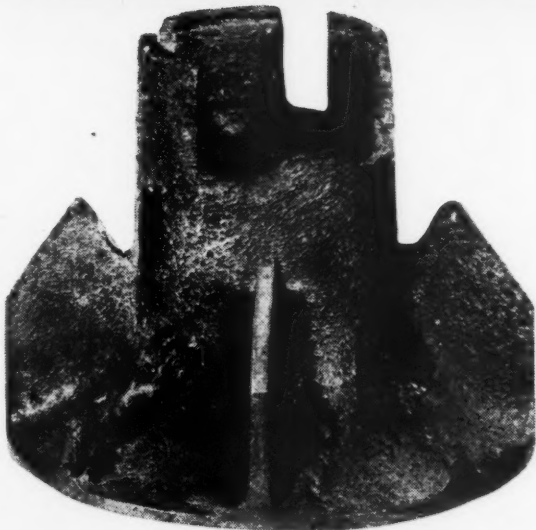
RADIATORS

- 817-Q.**—When the inspection is completed, what should be done?
A.—Paint interior with Pittsburgh Glass Co. Red Sealer #50031 or its equivalent.
- 818-Q.**—When preparing for engine assembly, what first should be done?
A.—Install lube oil header.
- 819-Q.**—Should this installation be completed at this time?
A.—No. Do not tighten and wire the capscrews until the free end casing has been applied.
- 820-Q.**—What action should follow?
A.—Install the lube oil drain plug.
- 821-Q.**—What is the final operation previous to assembly?
A.—Thoroughly clean all mating surfaces and apply a THIN coating of joint sealer.
- 822-Q.**—What is the order of assembly?
A.—The reverse procedure of removal. Tighten and wire all capscrews. Thoroughly clean the base and apply the sump screens.
- 823-Q.**—Where is the free end casing located?
A.—It is mounted on the free end of the base.
- 824-Q.**—What does the free end casing contain?
A.—It houses vibration damper and pump gearing.
- 825-Q.**—What mounting surfaces does it provide?
A.—Mounting surfaces for the engine water pump, lubricating oil pump, turbosupercharger support and fuel oil filters.
- 826-Q.**—What action should be taken when preparing to remove the end casing?
A.—Attach a suitable sling to the casing and apply just sufficient tension to take slack out of cable.
- 827-Q.**—What action should follow?
A.—Remove dowel pins with dowel puller, remove all capscrews both internal and external, between free end casing and base; lift casing free of engine.
- 828-Q.**—What is recommended under the heading of inspection and maintenance?
A.—Clean, inspect and paint inside with Red Sealer #50031 or its equivalent.
- 829-Q.**—In case the same casing and base are to be re-mated, what is the procedure?
A.—Apply casing to base, dowel, tighten and lock-wire.
- 830-Q.**—If either a new base or a new casing is used what is the first step to be taken?
A.—Apply casing and snug up.

* This series of questions and answers relate specifically to the Alco-G.E. Diesel electric locomotives. The figure numbers and references, by number, to diagrams, etc., relate to the current edition of the Alco-G.E. operating and maintenance manual.

- 831-Q.**—What action should follow?
A.—Place aligning plate on top of casing so that the edge of the plate is flush with right side of the base.
- 832-Q.**—How is the casing lined up?
A.—Shift the casing until the edge of bore for crankshaft extension is flush with notched area of aligning plate.
- 833-Q.**—What is the proper relation of top surface of casing flange to the top surface of the engine base?
A.—The top surface of the casing flange is to be 2.375" below the top surface of engine base.
- 834-Q.**—How may this measurement be determined?
A.—By the use of a surface gauge or by the use of alignment gauge blocks.
- 835-Q.**—When the alignment is completed, what should be done?
A.—Securely tighten corner capscrews and drill and dowel casing to base. Securely tighten remaining capscrews and lockwire.
- 836-Q.**—What should be done in the event that a new casing is to be applied to an original base with cylinder block still in place?
A.—It can be positioned 2.375 in. below the top surface of base flange with a surface gauge or depth micrometer, and aligned to crankshaft extension by calipering between shaft and casing bore.
- 837-Q.**—What does the cylinder block house and support?
A.—The major components of the engine: crankshaft, rods, pistons, water jackets and liners, cylinder heads, etc.
- 838-Q.**—What are additional provisions of cylinder block?
A.—Mounting surfaces for the turbocharger support, cooling water headers, camshaft casing and generator adaptor. The upper crankshaft bearing saddles and the lower portion of the intake manifold are integral parts of the block.
- 839-Q.**—What is the procedure for removing a stripped block from the base?
A.—If all of the component parts of the cylinder block have been removed, pull the block locating dowels and remove all capscrews, interior and exterior, which secure the block to the base. Remove block.
- 840-Q.**—How would you proceed to remove the block from the base?
A.—Strip free end of engine, i.e., turbocharger end, remove governor and related piping. Remove fuel oil filters and cooling water pump discharge lines. Remove air intake elbow, turbocharger and its support and associated piping.
- 841-Q.**—What should be done next?
A.—Remove the main generator.
- 842-Q.**—What should follow?
A.—Remove oil jumper lines between bearing caps and main lube oil header. Remove all capscrews and dowels between the base and block and base and generator adaptor.

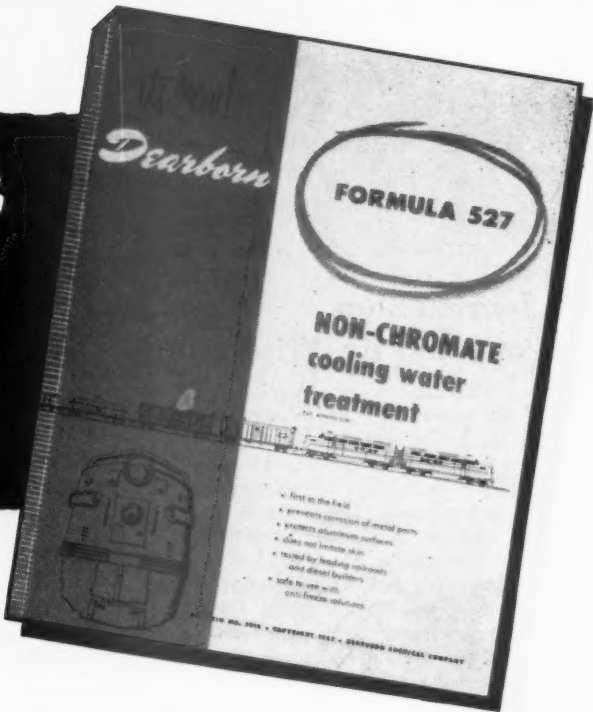
Bulletin 5014 should be in your files!



Corroded impeller which required replacement after short service life.



Damage to cylinder liner caused by improperly treated cooling water.



Dearborn Formula 527... is the ORIGINAL NON-CHROMATE Cooling Water Treatment for the prevention of corrosion on all cooling system metal parts—including aluminum. Formula 527 has been thoroughly pre-tested by leading railroads and diesel builders. It does not irritate the skin. Safe to use with anti-freeze solutions. Your Dearborn representative will gladly demonstrate why Formula 527 reduces maintenance expense on your diesel equipment.

DEARBORN CHEMICAL COMPANY
Merchandise Mart Plaza, Chicago 54, Ill.

COMPACT TEST KITS

Now available.
Contain all supplies
necessary for
"on-the-spot"
field testing
of treatment
strength.



Dearborn

COMBATTING CORROSION
EVERYWHERE SINCE 1887

DEARBORN CHEMICAL COMPANY • Merchandise Mart Plaza, Chicago 54, Illinois

Dept. RM
Dearborn Chemical Company
Merchandise Mart Plaza, Chicago 54, Ill.
Please send me Bulletin No. 5014 on
Dearborn's new NON-CHROMATE
TREATMENT—527.

Name.....
Position.....
Railroad.....
Address.....
City.....State.....

NEW DEVICES

New Journal Stop Developed on the Frisco

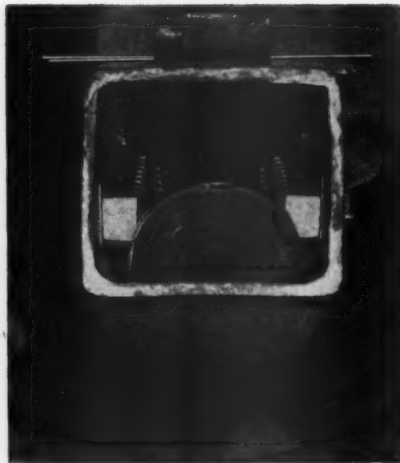
A device to eliminate one of the principal causes of hot boxes—the displacement off the journal out of its bearing when the car is impacted during switching or subjected to heavy slack runs on the road—has been developed and patented by J. L. Ryan, mechanical engineer of the St. Louis-San Francisco at Springfield, Mo. Known as the RS Journal Stop and Waste Retainer, and marketed by the Magnus Metal Corporation, the stop limits the relative movement between the journal and its bearing and thereby prevents displacement of the journal from its bearing.

The device has been on test on nine Frisco cars, with the first of the applications having been in service 17 months. It consists of two stop inserts of cast bronze bearing metal, one on each side of the journal box, and each directly and detachably secured to the associated side of the journal box by a cap screw passing through the side of the box and threaded directly into the insert thereby supporting the insert against movement in any direction.

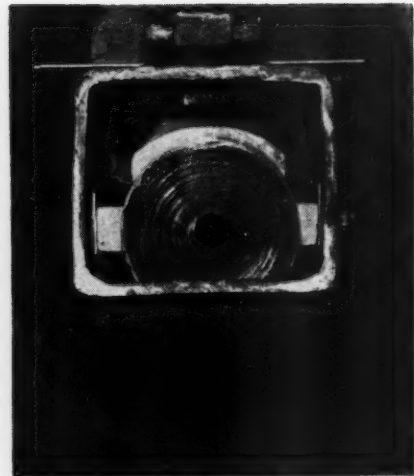
The inserts are of such thickness that a small amount of clearance exists between the journal and each insert during normal running. The sum of the clearances between the journal and the insert on either side determines the maximum amount of travel of the journal relative to the box. The face of the insert that is contacted by the journal at its limits of travel is machine finished. The combination of the bronze of bearing metal analysis and the machined surface assure good bearing characteristics during any long periods where the two surfaces are in contact, as would occur during a prolonged brake application on a lengthy down grade. The face of the stop is also designed to permit uninterrupted lubrication to the bearing when the journal is in contact with the stop. The face is finished with intermittent bearing areas and recesses, each $\frac{1}{2}$ in. wide, the recesses permitting the oil to be fed from the waste to the bearing.

The stop can be made to fit to any size journal. They are made $2\frac{1}{2}$ in. shorter than the journal with the clearance divided equally between the collar and the fillet end. The lower face of the stop is 1 in. below the center line, and the top face is $\frac{3}{4}$ in. below the underneath face of the lugs on the journal bearing. The latter provides the necessary clearance to jack up the box for renewing the wedge and the bearing. The design contemplates the application of shims between the wall of the journal box and the journal stop to compensate for journal diameters that are appreciably below standard.

The application of the journal stop does not add any serious complications in chang-



The design and installation of the stop permits jacking the box to replace the brass and wedge without removing either insert.



The stop installed, showing how it limits movement between journal and box and prevents displacement of journal from its bearing.

ing wheels. One journal stop insert per box, preferably the one on the outer face that is more accessible, is removed. The side frames are slipped outwardly until the inner back wall clears the dust guard seat, then the wheels moved with a pinch bar until the journal collar clears the remaining journal stop insert.

Results of Road Service Test

The journal stops have been applied to the test cars with total clearances varying from $\frac{1}{16}$ in. to $\frac{3}{8}$ in., and a careful follow-up of the performance of each application is being made. Tests on all the applications to date indicate that:

1. The stop functions to prevent displacement of the journal from the bearing as it was designed to do, and the functions also as an excellent retainer for the waste pack, preventing the rolling of the packing against the sides of the journal box.

2. The restraining of the relative movement of the journal to the box under impact greatly prolongs the service life of the journal bearing by eliminating the side hammering of the journal bearing and thereby prevents the lining from rolling out over the side, a major source of lubrication trouble.

3. Observers consider that approximately 90 per cent of the possible trouble from hot boxes on line of road can be eliminated on cars equipped with this journal stop.

The initial application of the RS journal stop was applied with approximately $\frac{3}{8}$ -in. total clearance and has been in service for 17 months. The last inspection was made after 13 months service. It reveals that the faces of the journal stop were concave to a depth of from $\frac{1}{32}$ in. to $\frac{3}{64}$ in., that the pattern of the bearing area in the journal bearing was approximately $2\frac{1}{2}$ in. wide in the crown, and that there was no running out of the lining over the sides of the

bearing. This installation was made to one truck of a 50-ton ballast car which has been in continuous service.

The other eight applications are on 70-ton ballast cars. The stops in each of these cases are applied to one truck, with new bearings and new wheels applied to both trucks to provide a test for comparative journal bearing and wheel flange performance.

Installation of the stop is comparatively simple. Jigs have been built by the Frisco to correctly locate the $1\frac{1}{16}$ -in. holes in the box walls using a drill with an extended shank, working from the outer end of the truck side frames and drilling through both walls in one operation. The cap screws which secure the stops in place are 1-in. diameter, eight threads per inch. The heads of the screws are drilled $\frac{3}{32}$ in. to lock them together with a $\frac{1}{4}$ -in. rod to prevent loosening during operation.

Sun Glare Shields

Glass-adhering shields for protection against intense sun glare can now be supplied for application to window areas of diesel locomotives. Called Filterzone Thermo-Glare Shields, they are manufactured by Filterzone Autovision Company, Brooklyn 21, N.Y.

Formulated from a flame and acid-resistant vinyl plastic, it can be secured permanently to glass and when desired, removed without difficulty. The shields filter out annoying glare, and are said to reduce eye fatigue and eliminate the need for painted windows and blinds.

They are available in various colors and may be purchased in sheet form or cut to window dimensions.

MET-L-WOOD

METAL BONDED TO PLYWOOD

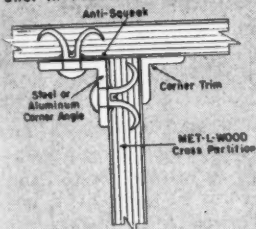
VERSATILITY

FOR MODERN CAR INTERIORS

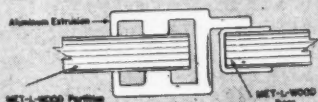


Met-L-Wood walls provide a smooth, luxurious finish in addition to saving weight and simplifying construction.

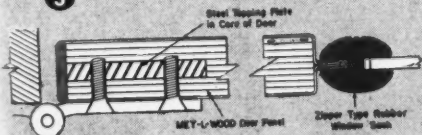
Panel Intersection Connections



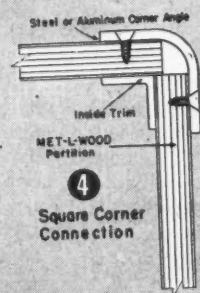
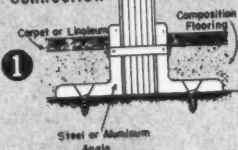
2 Interior Door (Alum. Extrusion Constr.)



3 End and Vestibule Doors



Floor Connection



MET-L-WOOD passenger car partitions, doors and paneling not only produce beautiful finished surfaces, but can also save up to 73%* in weight and a substantial amount of construction time. Shown at left, and described below are typical Met-L-Wood construction details. Full information on Met-L-Wood versatility in new or rebuilt cars will be furnished promptly on request. Write today.

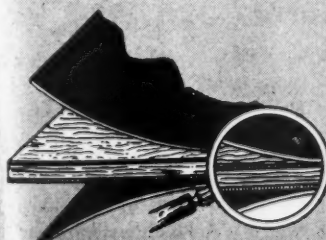
1 Panel intersections with Met-L-Wood can be made invisible from outside with the use of split rivets. Floor connections may be made in a variety of ways, one of which is shown here, using through-rivets and metal screws.

2 Interior doors of Met-L-Wood can be fitted with aluminum extrusion door stops; or the Met-L-Wood partition formed so that the door stop is an integral part of the panel.

3 Steel tapping plate inserts can be put in Met-L-Wood doors at proper places for solidly anchoring hinges and door-opening devices. Note simplicity of using zipper-type window openings.

4 Square or rounded corners are made with Met-L-Wood panels and steel or aluminum corner forms. Corner forms can also be fastened with split rivets or through-rivets, as well as with wood or metal screws.

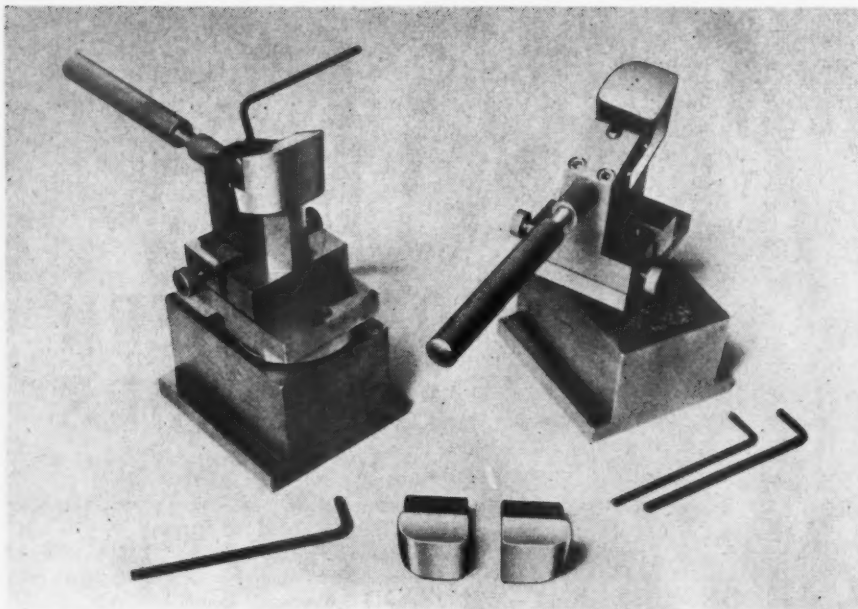
*Met-L-Wood panels $\frac{3}{8}$ " thick, with steel both sides, have a stiffness factor exceeding that of $\frac{1}{4}$ " solid steel plate, while weighing only 27% as much as steel!



MET-L-WOOD CORPORATION

6755 West 65th Street, Chicago 38, Illinois

MET-L-WOOD • STRONG...LIGHT...Smooth Finish...Sound Deadening...Fire-Resisting...Insulating



Radius Grinding Fixture

A radius grinding fixture has been developed by the Apex Tool & Cutter Co., Shelton, Conn., for redressing radius tools of the serrated inserted type used for finishing axles with $\frac{1}{8}$ in.- $\frac{3}{4}$ in. radii.

This fixture is designed to regrind the $\frac{3}{4}$ in. radius on both the right hand and left hand tools to give a true radius for cutting journal bearing surfaces. Accurate

contour on an axle turning operation facilitates the burnishing job which follows. The fixture features built-in adjustments to allow for tool wear both on length and width. It is built with opposed roller bearings for rigidity and designed to fit any table of a standard tool and cutter grinder, as well as most grinders with mechanical in-feed hand wheel.

Although designed primarily for the $\frac{3}{4}$ in. radius grinding, it also can be used to grind or dress other radii within a range of approximately $\frac{3}{8}$ in. to $1\frac{1}{8}$ in.

■ ■ ■



Motor-Operated Rheostat

A motor-operated field rheostat, used to adjust speed of d.c. motors up to 200 hp. and voltage of generators up to 300 kw., is available from the Westinghouse Electric Corporation.

Called Type RK, this rheostat uses snap-action limit switches. Two cam-operated switches are supplied with each unit with additional switches available for

auxiliary circuits. Each cam is adjustable over a 360-deg. range from the front of the rheostat, and is available for 15-, 45-, and 90-deg. travel.

Two different gear ratios can be supplied: one permits full rheostat travel in from 5 to 15 seconds; the other permits full travel in 15 to 45 seconds. The travel time can be adjusted over a 3-to-1 range by inserting resistance in the motor circuit.

The drive mechanism mounts on the front panel. Up to three standard rheostat plates can be mounted on the rear of the panel, and all components are readily accessible for inspection or adjustment.

■

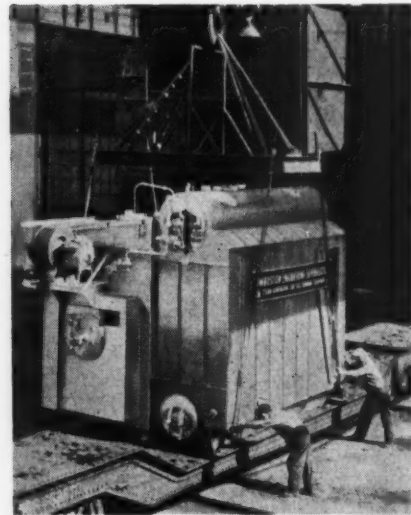
Electrical Cleaner

A cleaning agent suitable for a variety of applications including electrical equipment has been introduced by Chemicals & Materials Distributors Corporation, Terre Haute, Ind., called Vego No. 17. It is said to be suitable for cleaning all electrical equipment, commutators on generators and motors of all types, floors and catwalks, generators and traction motors, diesel engine housings accessory ends of generator units, auxiliary motors, and communication and signal equipment.

The manufacturer states that it is safe for workmen to use, does not constitute an

explosion or fire hazard because of a relatively high flash point, and, in practically all cases, it is a one operation cleaner. The maker also states it does not corrode metal, does not damage varnish coating on armatures or painted surfaces of motors, does not damage mica insulation on commutators and it does not remove carbon film from commutators.

■



Water-Tube Boilers

Standardized, shop-assembled water-tube boilers, the Type VP Package Boiler, have been introduced and announced by Combustion Engineering, Inc., New York 16. It is a compact steam generating unit, designed for the maximum pressure range up to 250 lb. per sq. in. gage and for steam capacities ranging from 4,000 to 30,000 lb. per hr.

Design of the unit is based on the two-drum, vertical-bent-tube arrangement with a water-cooled furnace in front of the convection surface. It is designed for pressure firing of oil or gas either alone or in combination.

A complete automatic control system is supplied as standard equipment. It adjusts the air and fuel in proper proportion to the needs of fluctuating loads. The unit can be skidded or lifted from a railroad car or truck on to a simple foundation. Lifting lugs are provided so that it can be readily unloaded and handled by a crane.

■

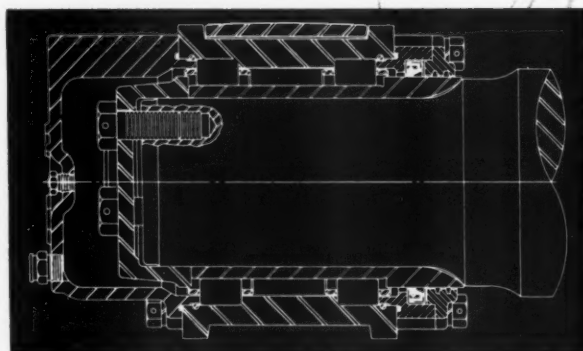
Drive Pin Blind Rivets

One man from one side of the work can install these rivets with an ordinary hammer or standard air hammer. The drive pin in the device is driven into the sleeve after the rivet is seated in the hole. Driving action causes the tapered node of this pin to expand the walls of the sleeve outwardly forming a blind head on the end of the sleeve.

Available from the Huck Manufacturing Company, Detroit, Mich., these devices

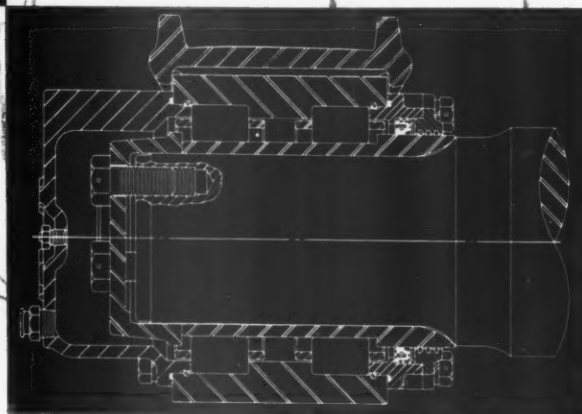
2

Hyatt designs to solve your freight car hot box problem!



HYATT "PACKAGE" TYPE BOX shown opposite is for use in integral box side frames originally designed for plain bearings. Boxes are available in all standard journal sizes.

HYATT PEDESTAL-TYPE BOX shown below is designed to fit directly into a pedestal-type side frame. Boxes are available in all standard journal sizes.



Whether you are ordering new freight cars or converting old cars, Hyatt is ready to help you eliminate the tremendous cost of hot boxes. For Hyatt offers two easily-installed roller bearing journal boxes—one designed for freight car trucks having pedestal-type side frames, the other for trucks with integrally cast side frames.

With either of these Hyatt boxes you will gain maximum return on your investment. In addition to obvious economies—elimination of the hot box problem, greatly reduced inspection man-hours, huge savings in lubrication costs, reduced damage to lading—Hyatts for freight offer basic design advantages.

ONLY HYATT OFFERS THESE EXTRA ADVANTAGES

Controlled lateral—Hyatt design allows freedom of axle movement through the bearing, thus cushioning shocks, minimizing wear on wheels and truck parts, and reducing the possibility of damage to lading.

Press fits are not disturbed when boxes are removed for inspection.

Quick and easy inspection down to individual rollers—the result of Hyatt's simplicity of design.

Reduced inventory is possible because spare axles and wheels need to be fitted with inner races only.

Straight radial rollers of large size provide for maximum load-carrying capacity and longer usable life.

For further information, write to Hyatt Bearings Division, General Motors Corporation, Harrison, New Jersey.

**RUNNING
MATE
OF
DIESEL
FREIGHT**

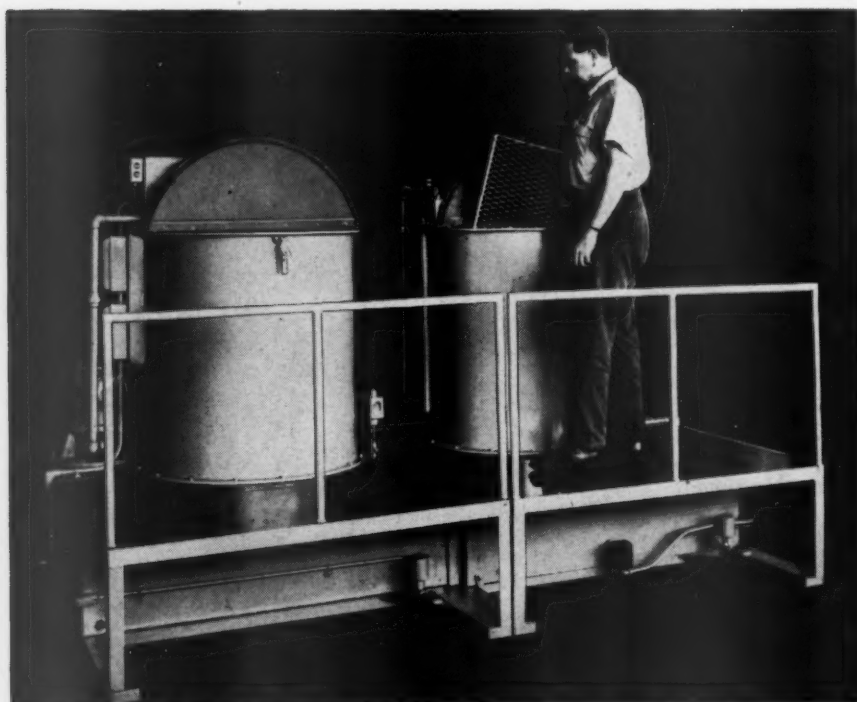
HYATT

Roller Bearing Journal Boxes

known as Deutsch Drive Pine Blind Rivets are manufactured under license of North American Aviation, Inc. They are fabricated in both the flush and protruding

head types. Sleeves are of stainless steel or aluminum alloy with drive pins of stainless steel. Rivets are supplied in $\frac{3}{16}$, $\frac{1}{4}$, $\frac{5}{16}$ and $\frac{3}{8}$ in. dia. sizes.

■ ■ ■



Paxton-Mitchell Twin units used in cleaning, drying and oiling air filters with any type of coating including semi-fluid.

Applying Semi-Fluid Air Filter Coatings

Improved equipment for applying the new semi-fluid air filter coatings has been developed recently by the Paxton-Mitchell Company, Omaha, Neb. It includes two companion units, one a washing machine which functions somewhat like an automatic clothes washer, and the other an oiler which operates on an automatic cycle, applying the coating material at a controlled temperature in the correct amount recommended for greatest filtering efficiency.

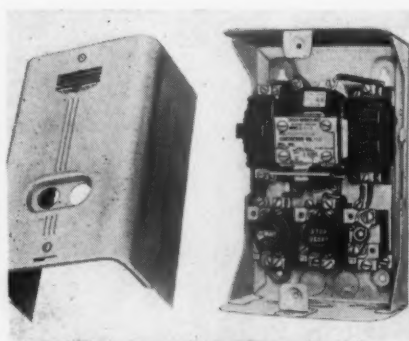
The new oiling unit applies any type of coating, including the semi-fluids in precisely the specified amount, on each filter treated, then shutting itself off. All the operator has to do is load the machine, push a button to start and then unload the filters when the machine stops. This is said to eliminate the chance for error on the part of the operator in applying too much or too little coating on the filters.

The cleaning cycle of the washer is manually controlled which gives the operator necessary latitude for the degree of washing required to get the filters thoroughly clean.

The two machines are complete, packaged units which enable one man to do an exceptionally good job of cleaning, drying and oiling standard size, permanent-type air filters at high speed. Centrifugal force, combined with the cleaning and oiling cycles of the washer and oiler machines does the work quickly and efficiently, it is

claimed, so that each filter comes out thoroughly cleaned and with the amount of coating specified by the manufacturers of the coating material.

Another major advantage claimed is the reduction of filter inventories since the filters may be cleaned and oiled and immediately returned to the locomotive or car.



Magnetic Starters, Contactors and Relays

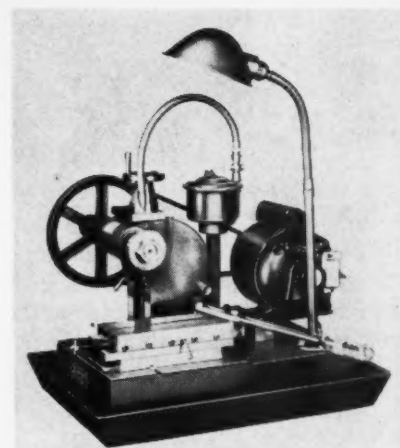
Announcement is made by Cutler-Hammer, Inc., Milwaukee 1, Wis., of a new line of magnetic starters, contactors and relays. The line incorporates a simple five-unit construction designed to install easier, work better, last longer. A wrap-around cover pulls off, fully exposing the front and

both sides of the unit for 180 deg. accessibility. The five independent parts consist of two contact blocks, a magnet coil, an armature and a three-coil or two-coil overload relay mounted on a steel panel. Each part can be removed from the front without disturbing another part.

The units are featured by a three-coil, adjustable overload relay permitting four ratings from each heater coil by changing its position. The three-coil overload offers protection against single phasing where unbalanced or unstable line conditions may occur.

The double-break contacts, made of a silver alloy, can be inspected by pulling off a snap-on cover. The contacts can be removed without tools. The complete contact block can be removed by loosening two screws; the overload relay by turning out two screws. The armature, which pivots on rolling bearings, and the magnet coil may be replaced without tools. The complete panel, with all units assembled, can be taken out of the metal case by loosening three screws. All terminals are angled to face front, and are equipped with solderless connectors. The cover and base are finished in grey enamel baked on bonderized metal. The unit illustrated is an N.E.M.A. size O starter.

■



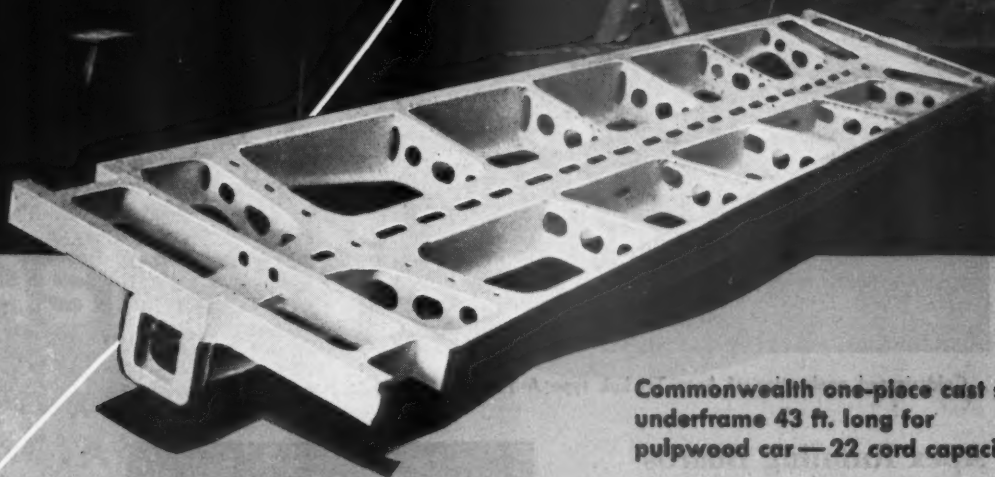
Bench-Type Mill

To handle a wide variety of light milling operations such as making key ways, slotting, splitting, squaring, spline cutting, etc., the Viking Mill has been introduced and announced by Viking Industries, Rockford, Ill.

It has a heavy-duty spindle mounted on ball bearings and is powered by a $\frac{1}{3}$ hp. motor for operation on standard 110 volt, 60 cycle circuits. Interchangeable pulleys make possible a range of speeds up to 7,000 r.p.m. Base dimensions are 11 by 18 in.

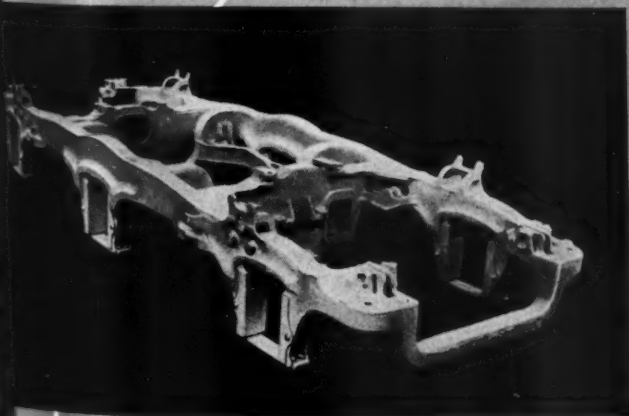
A single slide table, having large dovetail ways and adjustable gibs, permits 4 in. travel. It has an adjustable stop at both ends to limit travel. A $\frac{1}{2}$ in. or 1 in. arbor and draw-bar are used for end mill holders and arbors. The mill is equipped with a self-contained motor-driven coolant pump for operation with all types of water soluble coolants.

IN THE MAKING...



Commonwealth one-piece cast steel underframe 43 ft. long for pulpwood car—22 cord capacity.

Commonwealth One-Piece Steel Castings



Cast steel 6-wheel motor truck frame for diesel locomotive.

***Rugged, Dependable, Efficient
in all Types of Railroad Service***

Here molten steel is being poured from a 50-ton ladle into a mold where it will take the shape of one of the many **COMMONWEALTH** one-piece cast steel products for railroad cars and locomotives.

Forming castings in one piece makes possible the most economical distribution of metal where it is needed for greatest strength, usually with a saving in over-all weight. The one-piece design combines many separate parts in a single casting assuring economy of maintenance and increased availability of railroad equipment.



GENERAL STEEL CASTINGS

GRANITE CITY, ILL.



EDDYSTONE, PA.

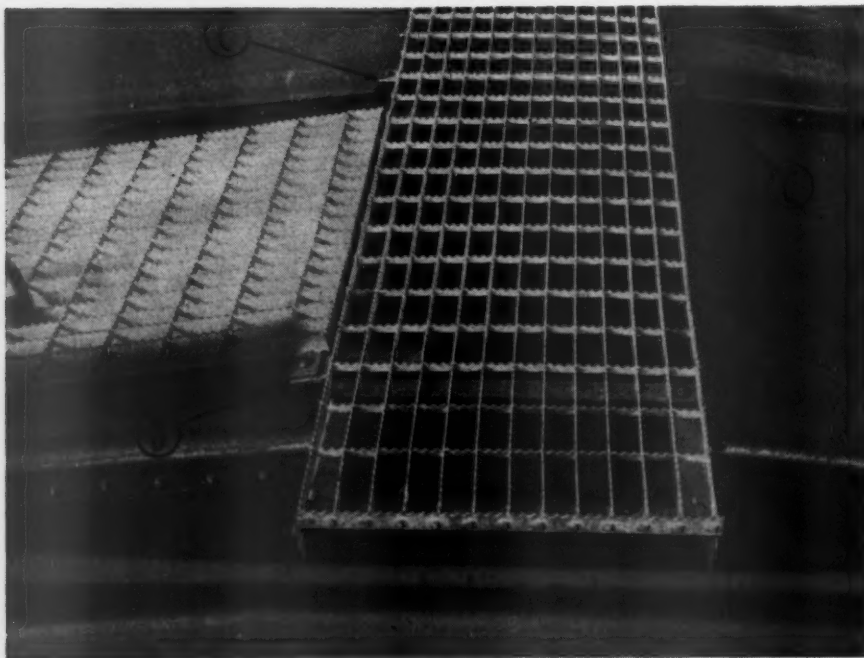
Rust Preventing Oil

Penetrol, a clear, air-drying, rust-preventing oil produced by the Flood Company, Hudson, O., has long been used in the steel, oil, shipping, transportation and other industries for its ability to prevent and inhibit damage caused by oxidation of iron and steel. Penetrol is a highly dispersible oil that penetrates quickly to the base metal on exposed or tightly closed

surfaces such as joints. It utilizes rust (iron oxide) to form a protective coating which offers an excellent paint foundation.

Penetrol has three major uses: (1) It stops rust action on steel without the necessity of removing the rust; (2) it is a reinforcing additive for practically all air-drying oil type maintenance paints except lacquer, plastics, rubber or water base paints and coal tar materials; (3) it is a vehicle for aluminum paste or powder.

■ ■ ■



Cold-riveted application of Apex Tri-Lok type A-1 running board to a modern box car

Apex Running Boards Applied With Rivets

The Apex Railway Products Company, Chicago, has recently changed its recommended method of applying Tri-Lok Type A-1 metal running boards from bolted to permanent cold-riveted connections which contribute to increased safety and reduce both the material and labor cost of application. Materials also conserved by an increase from 3½ in. to 5½ in. in crossbar spacing which has been approved by the A.A.R. and helps effect a total saving, variously estimated from \$6 to \$9 a car.

The new running-board application on the average 40-ft. car utilizes 48 to 50 ¾-in. by 1½-in. rivets, cold driven by a Chicago Pneumatic hydraulic riveter with special yoke, instead of 64½-in. by 1½-in. carriage bolts and nuts formerly required. By eliminating loose connections as originally installed or developed in service, the use of rivets is expected to promote safer running-board conditions, reduce maintenance cost and help keep cars in service instead of on repair tracks where they must go to have loose running boards properly tightened.

In applying Tri-Lok Type A-1 running boards by this method, the longitudinal sections have ¼-in. by 1½-in. continuous fastening bars welded to the bottom and



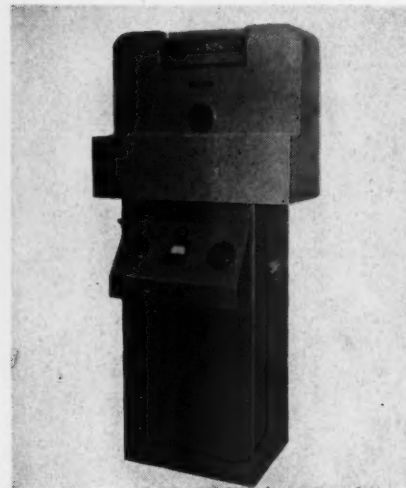
How rivets are driven cold by Chicago Pneumatic hydraulic riveter with special yoke for use in applying metal running boards

positioned so as to rest on saddles extended 19/16-in. at each end to accommodate rivets just outside the running board. This is clearly shown at CC in one of the illustrations. Drift pin holes in the fastening bars and saddles permit lining up end holes for easy insertion of the ¾-in. rivets which are easily driven cold in this outside position by the hydraulic riveter in much less time than formerly required to apply bolts and tighten nuts in the restricted space underneath running boards.

Latitudinal running boards are secured at the inner end by riveting to ¼-in. by 1½-in. by 5¾-in. bracket straps, as shown at B, the short bracket straps being securely welded to four of the longitudinal serrated bars. With ZU-section side plates, now increasingly used, the outer ends of latitudinal running boards are also applied with cold-driven rivets from outside the car, no backing up of rivets being necessary in the car interior, thus effecting additional labor saving. Handholds are applied to latitudinal running boards in the usual manner and in full compliance with U. S. Safety Appliance regulations.

Extended-type saddles, required with the new riveted application of Tri-Lok Type A-1 running boards, are supplied at no extra cost by the car-roof manufacturer. The special yoke developed for this particular cold-riveting operation is available for use with present riveting equipment as found at most modern car building and car repair shops.

■



Ultrasonic Degreaser

The device utilizes ultrasonic waves to clean metal parts. Made by Topper Equipment Company, Clark Township, N. J., it is said to remove oil, grease, chips, dirt, lapping compound and other contaminants from surfaces of small work pieces.

A G-E ultrasonic generator converts high frequency electric energy into high frequency vibration by means of a quartz crystal. This energy is transmitted through the cleaning tank, accelerating normal cleaning action. After cleaning, parts are rinsed by fresh, clean fluid and are dried by the vapor process.

Equipment built around the ultrasonic generator is available in either continuous production or batch type methods.

■

Rectifiers for Electroplating

A complete line of metallic rectifier power supplies for electroplating and anodizing operations has been announced by the Gen-

(Continued on page 108)

FROM COAST TO COAST in U.S. or CANADA

IT'S

LUBRIKO GREASE

M-1 SPECIAL
FOR ROLLER BEARING CAR JOURNALS



THE
TEST
TELLS

You can now travel from coast to coast in the United States or Canada in roller bearing-equipped passenger cars lubricated with LUBRIKO M-1 Special. This means you're getting the world's smoothest railroad ride because the LUBRIKO-lubricated journals are operating at maximum efficiency.

Operating tests from coast to coast, summer and winter, show LUBRIKO-lubricated bearings go from wheel-turning to wheel-turning without attention. This means a saving of

more than 60% in journal bearing lubrication costs.

LUBRIKO M-1 Special is A.A.R. approved for interchange with all four bearing manufacturers... even with bearings originally designed for oil lubrication, the change-over to LUBRIKO grease, in most instances, can be made without mechanical modification. Merely remove the oil, clean the housing, "butter" the bearings, and fill with LUBRIKO M-1 Special to the proper level.

Write today for further engineering data on the advantages of LUBRIKO lubrication of roller bearing car journals for your railroad.

A. A. R.
PROVED FOR
INTERCHANGE

You are **SAFE** with **LUBRIKO**
THE MASTER LUBRICANT



MASTER LUBRICANTS COMPANY

PHILADELPHIA, PA. • LOS ANGELES, CALIF.

MANUFACTURERS OF HIGH-GRADE INDUSTRIAL LUBRICANTS FOR OVER 25 YEARS
CHICAGO • BOSTON • SAN FRANCISCO
Established 1901

NEWS

M.R.O. Order Revoked by N.P.A.

THE railroad industry's maintenance, repair and operating supplies order—M-73—has been revoked by the National Production Authority.

The N.P.A. announcement of May 26 revoking that order said railroads which obtained their M.R.O. requirements under the order need not maintain records of orders placed for delivery after June 30.

Shenandoah Central Formally Opened

MAJ. GEN. CARL R. GRAY, JR., formerly head of the Military Railway Service in Europe during the war, drove the "golden spike" that officially opened the Shenandoah Central on May 29 at Penn Laird, a few miles east of Harrisonburg, Virginia.

The Shenandoah Central, locally known as the "Tweetsie Route," is the realization of a dream of three Harrisonburg rail enthusiasts: Dr. P. S. Hill, president of the line, C. G. Price, Jr., vice president and general manager, and W. W. Menefee, Jr., secretary-treasurer. Their purpose is to create an operating museum of narrow-gauge railroad equipment.

The locomotive, No. 12, built by Baldwin in 1917, and two passenger coaches were purchased from the Eastern Tennessee & Western North Carolina. A third coach was purchased from the East Broad Top. Approximately one mile of track, a 64-ft. trestle and a wye were built. The originators of the line frankly admit that it could not have been done without the assistance of several railroads. The equipment was purchased at token prices. Ties and ballast were donated by the Norfolk & Western, parts and supplies by the Southern, rails

SUMMARY OF MONTHLY HOT BOX REPORTS

	Foreign and system freight car mileage (total)	Cars set off between division terminals account hot boxes			Miles per hot box car set off between division terminals
		System	Foreign	total	
July, 1950.....	2,745,932,894			23,957	114,619
August, 1950.....	2,937,455,020	7,122	15,490	22,912	128,206
September, 1950.....	2,974,297,739	6,511	12,881	19,422	153,141
October, 1950.....	3,165,937,915	4,143	8,915	13,278	238,439
November, 1950.....	2,863,871,913	2,536	5,331	7,867	364,672
December, 1950.....	2,813,042,212	2,278	5,968	8,246	341,140
January, 1951.....	2,840,847,511	2,870	8,436	11,306	251,269
February, 1951.....	2,425,226,451	4,528	14,063	18,591	130,452
March, 1951.....	3,063,173,942	3,667	10,078	13,745	222,857
April, 1951.....	2,996,562,763	3,702	8,914	12,616	237,521
May, 1951.....	3,013,634,782	5,631	13,737	19,368	155,599
June, 1951.....	2,874,873,495	7,074	15,376	22,450	128,057
July, 1951.....	2,768,920,095	8,886	18,823	27,709	99,929
August, 1951.....	3,009,371,111	9,023	19,092	28,115	107,038
September, 1951.....	2,925,570,545	6,472	13,565	20,037	146,008
October, 1951.....	3,116,490,095	4,131	9,053	13,184	236,384
November, 1951.....	2,939,503,144	2,022	4,405	6,427	457,368
December, 1951.....	2,752,316,133	2,130	5,398	7,528	365,611
January, 1952.....	2,824,298,630	3,208	7,197	10,405	271,437
February, 1952.....	2,809,162,671	2,723	6,473	9,196	305,477
March, 1952.....	2,943,812,727	2,594	5,877	8,471	347,517
April, 1952.....	2,766,313,714	3,826	7,759	11,585	238,784
May, 1952.....	2,918,508,445	6,020	10,938	16,958	172,102
June, 1952.....	2,672,512,889	8,456	14,495	22,961	116,394
July, 1952.....	2,575,298,912	10,566	15,833	26,399	97,553
August, 1952.....	2,924,917,122	11,658	17,535	29,193	100,192
September, 1952.....	2,931,129,734	7,536	13,608	21,144	138,627
October, 1952.....	3,093,990,289	4,058	8,053	12,111	255,469
November, 1952.....	2,984,101,808	2,198	4,501	6,699	445,455
December, 1952.....	2,869,923,617	1,742	3,632	5,374	534,040
January, 1953.....	2,828,906,282	2,219	4,123	6,342	446,059
February, 1953.....	2,625,563,462	2,111	4,059	6,170	425,537
March, 1953.....	2,904,227,801	2,692	6,077	8,769	331,192

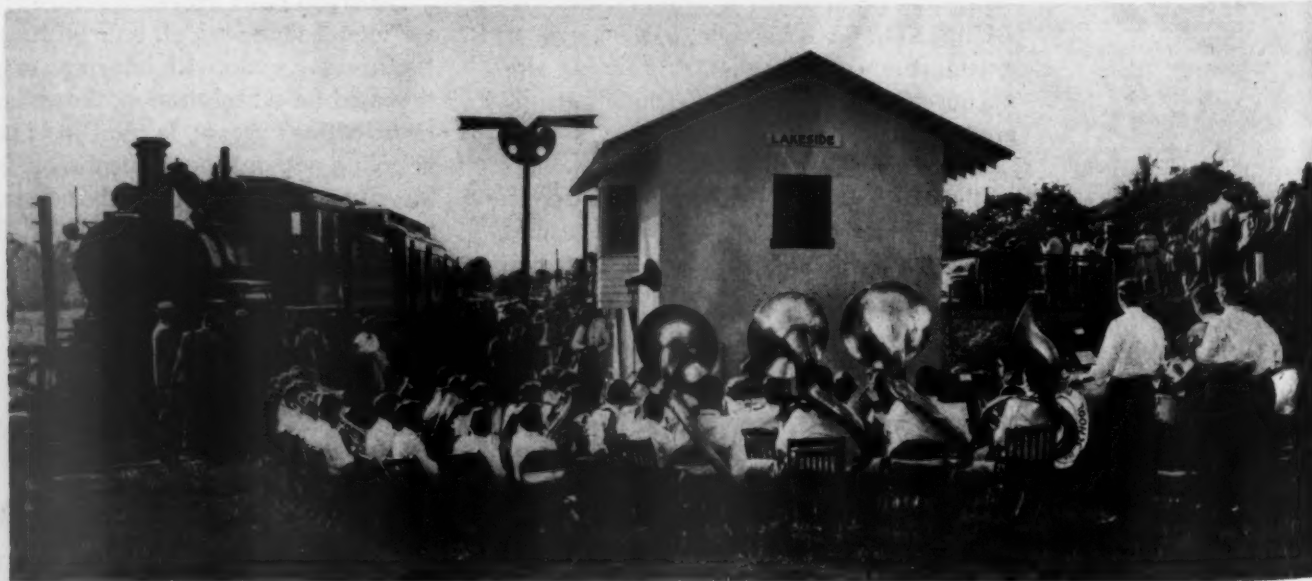
were donated by the Chesapeake Western and construction work donated by L. W. Huncke, president, William A. Smith Contracting Co., Inc.

The Southern Railway contingent, headed by C. M. Kimball, assistant to vice president, and A. W. St. Clair, general manager, Eastern Lines, escorted General Gray to the affair in business cars hooked on to a local freight to Harrisonburg. The Norfolk & Western party, headed by H. C.

Wyatt, vice president and general manager, and F. S. Baird, vice president traffic, rode in business cars on the rear end of a freight to Shenandoah.

Guests were served a buffet luncheon at the mountain lodge of D. W. Thomas, president, Chesapeake Western.

Owners of the line plan to operate the railroad on week-ends and holidays, presenting passengers with novel souvenir tickets.



Harrisonburg High School Band at the dedication ceremonies of the Shenandoah Central

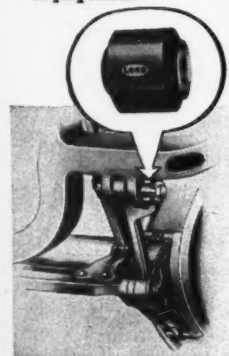


**Provide Longer Service Life
Lower Maintenance Costs on —**

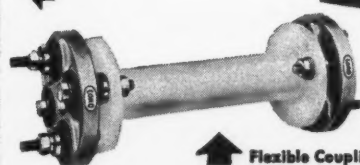
Generators
Signal Equipment
Train Communication
Systems
Electronic Control
Equipment

Automatic Stopping and
Wayside Equipment
Air Conditioning and
Ventilating Equipment
Passenger Car Luxury
Equipment

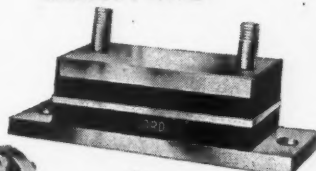
Undercar Accessories
Passenger Car Vestibule
Diaphragms
Maintenance Car Engine
Mountings
Traction Motors



Brake Hanger Support.



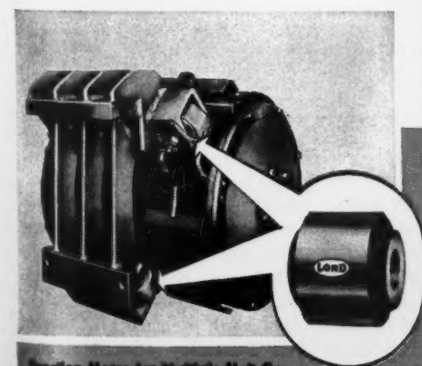
Flexible Coupling for Auxiliary Generator Drive.



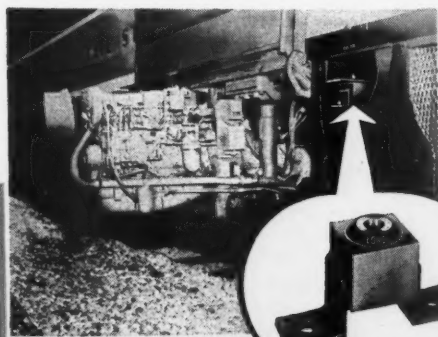
Traction Motor
Nose Support.



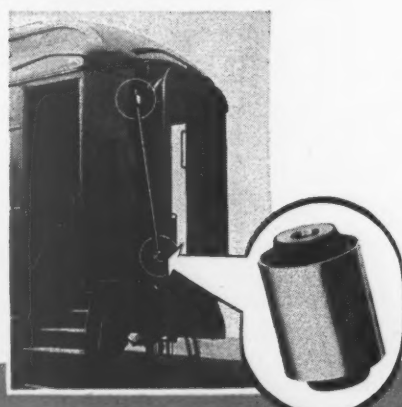
20 Ton Capacity Compressor for
air conditioning installation.



Traction Motor for Multiple Unit Car.



Undercar Engine Generator.



Diaphragm Bracket Support
between passenger cars.

MURKIN, CALIFORNIA
233 South Third Street

DALLAS, TEXAS
413 Fidelity Union
Life Building

PHILADELPHIA 7, PENNSYLVANIA
725 Widener Building

DAYTON 2, OHIO
410 West First Street

DETROIT 2, MICHIGAN
7210 Woodward Ave.

NEW YORK 16, NEW YORK
220 Madison Avenue

CHICAGO 11, ILLINOIS
220 N. Michigan Ave.

CLEVELAND 15, OHIO
Room 411 Harnett Building

LORD MANUFACTURING COMPANY • ERIE, PA.

**Booth 13N
Atlantic City
June 22-27**



Headquarters for
VIBRATION CONTROL

**Booth 13N
Atlantic City
June 22-27**

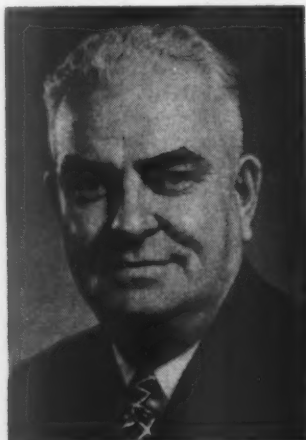
SUPPLY TRADE NOTES

GENERAL MOTORS DIESEL, LTD.—*William M. Warner* has been appointed director of sales of the Engine Sales division, at London, Ont., succeeding *Norman H. Daniel*, who has retired.

Mr. Warner joined General Motors in 1937 after his graduation from Princeton with a degree in mechanical engineering. He became associated with the G.M. research laboratory at Detroit during the early period of development of the industrial and railroad diesel engine and, later, held assignments at the Electro-Motive division at La Grange, Ill., and at the central office at Detroit.

GENERAL MOTORS CORPORATION, ELECTRO-MOTIVE DIVISION.—*Andrew G. Finigan*, former manager of Plant Three of the Electro-Motive Division at Cleveland, has retired.

Mr. Finigan began his business career with the General Electric Company in 1906. He was connected with the automobile industry until 1925, when he joined



Andrew G. Finigan

the Electro-Motive Company and assisted in supervision of car construction. He was transferred to LaGrange, Ill., shortly after the first Electro-Motive plant was completed in 1936 and became general foreman of the locomotive division. In 1940 he was appointed superintendent of the locomotive division at that point, and in 1948 manager of Plant Three at Cleveland.

PERMACEL TAPE CORPORATION. — The *Industrial Tape Corporation*, New Brunswick, N.J., has changed its corporate name to Permacel Tape Corporation to better identify itself with its products.

ROLLWAY BEARING COMPANY.—*John D. Williams* has been elected vice-president and general manager, succeeding *William B. Smithers*, who recently resigned.

Bruce Herbert, formerly in the industrial distributor sales department of Rollway, at Syracuse, N.Y., has opened an office

SELECTED MOTIVE POWER AND CAR PERFORMANCE STATISTICS

FREIGHT SERVICE (DATA FROM I.C.C. M-211 AND M-240)

Item No.	Month of February		2 months ended with February	
	1953	1952	1953	1952
3 Road locomotive miles (000) (M-211):				
3-05 Total, steam	11,921	19,172	25,409	39,863
3-06 Total, Diesel-electric	28,051	25,252	58,247	50,937
3-07 Total, electric	711	771	1,422	1,573
3-04 Total, locomotive-miles	40,736	45,203	85,192	92,382
4 Car-miles (000,000) (M-211):				
4-03 Loaded, total	1,532	1,640	3,159	3,288
4-06 Empty, total	821	880	1,728	1,778
6 Gross ton-miles-cars, contents and cabooses (000,000) (M-211):				
6-01 Total in coal-burning steam locomotive trains	20,533	34,979	44,294	72,266
6-02 Total in oil-burning steam locomotive trains	5,496	8,343	11,221	16,804
6-03 Total in Diesel-electric locomotive trains	77,847	70,542	160,835	139,962
6-04 Total in electric locomotive trains	2,017	2,175	3,949	4,316
6-06 Total in all trains	106,074	116,081	220,684	233,399
10 Averages per train-mile (excluding light trains) (M-211):				
10-01 Locomotive-miles (principal and helper)	1.03	1.04	1.03	1.04
10-02 Loaded freight car-miles	40.80	39.90	40.30	39.30
10-03 Empty freight car-miles	21.90	21.50	22.00	21.20
10-04 Total freight car-miles (excluding cabooses)	62.70	61.40	62.30	60.50
10-05 Gross ton-miles (excluding locomotive and tender)	2,828	2,827	2,811	2,785
10-06 Net ton-miles	1,272	1,317	1,266	1,299
12 Net ton-miles per loaded car-mile (M-211)	31.10	33.00	31.50	33.10
13 Car-mile ratios (M-211):				
13-03 Per cent loaded of total freight car-miles	65.10	65.10	64.60	64.90
14 Averages per train hour (M-211):				
14-01 Train miles	18.30	17.40	18.30	17.20
14-02 Gross ton-miles (excluding locomotive and tender)	51,190	48,598	50,840	47,408
14 Car-miles per freight car day (M-240):				
14-01 Serviceable	45.10	46.50	44.40	45.20
14-02 All	43800	44.40	42.40	43.10
15 Average net ton-miles per freight car-day (M-240)	71	953	862	927
17 Per cent of home cars of total freight cars on the line (M-240)	47.00	40.90	47.20	40.60

PASSENGER SERVICE (DATA FROM I. C. C. M-213)

3 Road motive-power miles (000):				
3-05 Steam	4,511	7,459	9,875	16,212
3-06 Diesel-electric	18,246	17,131	38,534	35,295
3-07 Electric	1,460	1,579	3,118	3,298
3-04 Total	24,217	26,171	51,526	54,808
4 Passenger-train car-miles (000):				
4-08 Total in all locomotive-propelled trains	242,642	259,244	518,756	541,707
4-09 Total in coal-burning steam locomotive trains	25,224	40,161	54,682	86,897
4-10 Total in oil-burning steam locomotive trains	14,264	24,410	32,399	51,838
4-11 Total in Diesel-electric locomotive trains	186,644	177,076	396,600	366,492
12 Total car-miles per train-mile	9.73	9.70	9.79	9.72

YARD SERVICE (DATA FROM I.C.C. M-215)

1 Freight yard switching locomotive-hours (000):				
1-01 Steam, coal-burning	568	939	1,208	1,959
1-02 Steam, oil-burning	110	167	229	341
1-03 Diesel-electric	3,132	3,058	6,558	6,283
1-06 Total	3,831	4,186	8,040	8,630
2 Passenger yard switching hours (000):				
2-01 Steam, coal-burning	21	33	45	71
2-02 Steam, oil-burning	6	11	12	24
2-03 Diesel-electric	239	245	509	510
2-06 Total	296	322	630	672
3 Hours per yard locomotive-day:				
3-01 Steam	6.40	7.40	6.40	7.40
3-02 Diesel-electric	16.40	17.10	16.30	17.00
3-05 Serviceable	14.70	14.70	14.60	14.70
3-06 All locomotives (serviceable, unserviceable and stored)	12.80	12.80	12.80	12.70
4 Yard and train-switching locomotive-miles per 100 loaded freight car-miles	1.72	1.76	1.75	1.81
5 Yard and train-switching locomotive-miles per 100 passenger train car-miles (with locomotives)	0.75	0.77	0.75	0.77

¹Excludes B and trailing A units.

in the Administrative building, 647 W. Virginia street, Milwaukee 4, Wis., where he will act as direct factory representative for Rollway in Minnesota and Wisconsin.

YALE & TOWNE MANUFACTURING CO.—The *Materials Handling Products Corporation*, 2704 Erie boulevard, East Syracuse, N.Y., as a distributor of industrial truck products for the Yale materials handling division.

AMERICAN BRAKE SHOE COMPANY.—*John L. Goheen* has been appointed district manager for commercial research on the west coast.

Mr. Goheen, who is now located in the San Francisco office of the company at 1010 Russ building, joined Brake Shoe as a research metallurgist in 1943. He served in the Metallurgical Research Laboratories until 1950 when he transferred

to market research and development work. As district manager he will supervise market studies and the development of new applications for the company's standard products in the west coast area, where plans are being made to start production of specialty cast irons such as ABK Metal (Ni-Hard) and Ductalloy (ductile iron). Mr. Goheen will also function as a technical representative of the company's research headquarters and will work with sales personnel of the metals division in the territory. Mr. Goheen is a graduate of Wooster College and has a master's degree in metallurgy from Massachusetts Institute of Technology.

BALDWIN-LIMA-HAMILTON.—*J. F. Connaughton*, formerly general manager of the Hamilton division, has been elected vice-president in charge of the Eddystone division.

Grease-lubricated TIMKEN® bearings eliminate journal lubrication between wheel-turnings

RIGOROUS operating tests on trains in regular service prove that passenger cars and diesels equipped with grease-lubricated Timken® bearings go full wheel-turnings without attention.

Four leading railroads, for example, have already made the switch from oil to grease for their Timken bearing equipped passenger cars. In one railroad's tests, grease-lubricated Timken bearings ran over 200,000 miles without the addition of any lubricant. Impressed with results like this, another dozen railroads, making their own tests with Timken bearings, are getting favorable results.

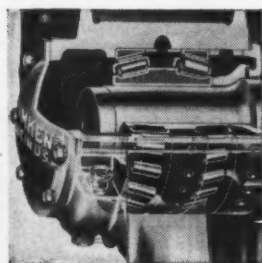
Railroads using Timken bearings realize new operating economies. Man-hours once

needed for checking and adding lubricant between wheel-turnings are eliminated. And then there are actual savings on the lubricant as well.

You don't need to modify the bearings or buy extra journal parts to convert Timken bearings from oil to grease lubrication. And they're the only railroad journal bearings which can consistently go a full wheel-turning period on AAR-approved grease without additional lubricant.

For more information about the operating economies of grease-lubricated Timken bearings, write The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ont. Cable address: "TIMROSCO".

TIMKEN
TRADE-MARK REG. U. S. PAT. OFF.
TAPERED ROLLER BEARINGS



*GREASE ME AT ONE
WHEEL-TURNING ...FORGET
ME 'TIL THE NEXT!*

NOT JUST A BALL ○ NOT JUST A ROLLER □ THE TIMKEN TAPERED ROLLER □ BEARING TAKES RADIAL AND THRUST → □ ← LOADS OR ANY COMBINATION → □ ←

WYANDOTTE CHEMICALS CORPORATION.—The new laboratories building at Wyandotte, Mich., was formerly opened on May 12 when a group of representatives, chiefly editors of business papers, were taken on an all-day inspection of the facilities. The first unit had been opened last January in accordance with "No ceremony, no ribbon cutting" but "move in as quickly as possible and keep on working" directions issued by Robert B. Semple, president of Wyandotte. The laboratories, some of which have movable walls and built-in services for flexibility of operation, occupy a T-shape building, 322 ft. wide by 172 ft. deep, having an area of 74,800 sq. ft. The building, designed as a permanent maintenance cleaning project, contains the following laboratories: industrial, laundry, food industries, microbiological, nucleonics, physics, electronics, analytical, organic and inorganic. Both the research building and the recently enlarged pilot plant are under the direction of *Dr. Thomas H. Vaughn*, vice-president of research and development. Research in the way of specially formulated chemicals and detergents for the use of the railroads in the maintenance of general facilities, passenger-car equipment, steam and diesel locomotives, and other diversified shop operations is under the supervision of *Andrew Liger*.



R. L. Reeves

Robert L. Reeves, has been elected vice-president in charge of sales of the J. B. Ford division of Wyandotte. Mr. Reeves

ORDERS AND INQUIRIES FOR NEW EQUIPMENT PLACED SINCE THE CLOSING OF THE JUNE ISSUE

DIESEL-ELECTRIC LOCOMOTIVE ORDERS				
Road	No. of Units	Horse-Power	Service	Builder
Minneapolis, St. Paul & Sault Ste. Marie.	6 ¹	1,500	Freight.....	Electro-Motive
	3 ¹	1,200	Switch.....	Electro-Motive
FREIGHT-CAR ORDERS				
Road	No. of cars	Type of car	Builder	
Atchison, Topeka & Santa Fe.....	500	70-ton gondola.....	Pressed Steel Car Co.	
Chesapeake & Ohio.....	100 ²	50-ton pulpwood.....	shops	
Chicago, Burlington & Quincy.....	30 ³	70-ton covered hopper.....	Pullman-Standard	
Chicago, Rock Island & Pacific.....	35 ⁴	70-ton covered hopper.....	Pullman-Standard	
Erie.....	2 ⁵	175-ton depressed center flat.....	Greenville Steel Car	
Fruit Growers Express Co.....	100 ⁶	70-ton mech. refrig.....	Company shops	
Georgia & Florida.....	300 ⁶	50-ton std. refrig.....	Company shops	
Maine Central.....	15 ⁷	50-ton rack.....	Bethlehem Steel	
Merchants Despatch Trans. Corp.....	100 ⁹	70-ton covered hopper.....	Bethlehem Steel	
Southern.....	320 ¹⁰	40-ton refrig.....	Company shops	
Wabash.....	40 ¹¹	70-ton covered hopper.....	Pullman-Standard	
		70-ton covered hopper.....	Pullman-Standard	
FREIGHT-CAR INQUIRIES				
Southern.....	75-100	Flat.....		
PASSENGER-CAR ORDERS				
Road	No. of cars	Type of car	Builder	
Bangor & Aroostook.....	2	Sleeping.....	Pullman-Standard	
Boston & Maine.....	4 ¹²	Sleeping.....	Pullman-Standard	
New York, New Haven & Hartford.....	11 ¹³	Sleeping.....	Pullman-Standard	
	4 ¹³	Lounge-buffet.....	Pullman-Standard	
Northern Pacific.....	10 ¹⁴	Coaches.....	Budd Co.	
	10 ¹⁴	Sleeping.....	Budd Co.	

¹ Delivery of freight units expected to be completed during July. Delivery of switchers expected in August.

² To be equipped with Hyatt roller bearings. Estimated cost, \$570,000.

³ For delivery in December.

⁴ For delivery during the fourth quarter of 1953.

⁵ Approximate cost, \$47,500 each. Delivery scheduled for October.

⁶ Delivery scheduled for the first quarter of 1954.

⁷ Estimated cost, \$778,650. Deliveries scheduled to begin about mid-September.

⁸ Approximate cost, \$126,000. Delivery expected in August.

⁹ Delivery expected during fourth quarter of 1953.

¹⁰ To cost over \$3,000,000. Deliveries expected to begin in November.

¹¹ Estimated cost, \$359,680. For delivery in November.

¹² To be of the six-section, four-double-bedroom and six roomette type. Estimated cost \$800,000. Delivery is scheduled for the third quarter of 1954. The B&M's intention to purchase this equipment was reported in the February issue, page 86.

¹³ Sleeping cars to be of the six-bedroom, four-section, six roomette type.

¹⁴ To be all-stainless-steel vista dome cars. For delivery next year. The road's intention to obtain this equipment was reported in the November issue of *Railway Mechanical and Electrical Engineer*, page 132.

Notes: Erie—The board of directors has authorized expenditures of \$6,500,000 for 1,000 new freight cars, including 500 40-ft. and 200 50-ft. box cars and 300 52-ft. drop-end gondola cars.

Chicago, Rock Island & Pacific. The Rock Island has received authority to purchase 12 all-room streamline sleeping cars. The cars will offer roomettes and bedrooms—the latter to be arranged for occupancy en suite if desired.

Pennsylvania.—The board of directors has authorized the purchase of 78 diesel units for yard and road freight switching services. When delivered, it is said, these new diesels will permit retirement of 109 steam locomotives, reducing the number of steam power units to 1,092.

Quebec, North Shore & Labrador.—The Pullman-Standard Car Manufacturing Company has started delivery from its Butler, Pa. plant of the first of 1,200 specially designed 95-ton ore cars which will be used by the new Quebec, North Shore & Labrador to haul ore 357 miles through Canadian wilds. These wholly new type cars will operate only 850 miles from the Arctic Circle. Because of the extreme temperatures to which they will be subjected, one car has been extensively tested in the car builder's research and development laboratories for the past six months. In addition, a series of road tests were carried out under winter temperature conditions in the Colorado Rockies. The cars are of all-welded construction for easy unloading, and differ widely in design from ore cars used on U. S. railroads. They are only 31½ ft. long, but have extra high sides to permit carrying 95 tons of ore. All are roller-bearing equipped. There are no hoppers underneath. They are designed to be picked up and dumped by a special unloading device. Special corner construction on the cars permits use of pusher pads for easy spotting in the car dumper. Pullman-Standard expects to complete delivery of the 1,200 cars to the railroad during July.

had been general manager of sales for the Ford division since joining Wyandotte in January 1950.

HOLLAND COMPANY.—*Frank J. Swanson* has been appointed Eastern region sales and service engineer at Chicago.



The new Research Laboratories of the Wyandotte Chemicals Corporation at Wyandotte, Mich. Some of the lime kilns and buildings of Wyandotte's Chemicals north plant are in the background.

The oil with *3-way action*

that keeps railway Diesels clean



- 1** Fights piston ring belt deposits (effective detergent action).
- 2** Resists sludging (high stability).
- 3** Prevents hard deposits on piston crowns (base stock quality and refining methods).

GULF DIESELMOTIVE OIL

These are the reasons why Gulf Dieselmotive Oil protects against the accumulation of harmful deposits on compression and oil-control rings, on piston crowns, and in ports. Because engines lubricated with Gulf Dieselmotive Oil stay cleaner, they use less oil and require ring jobs less often. This means lower maintenance costs and less time off the road. For further information, write, wire, or phone your nearest Gulf office.

GULF OIL CORPORATION
GULF REFINING COMPANY
PITTSBURGH 30, PENNSYLVANIA



SAFETY SEAL PISTON RING COMPANY.—*W. A. Wilson*, formerly factory superintendent, has been appointed south Texas sales representative.

BRANDON EQUIPMENT COMPANY.—*D. I. Packard*, who became vice-president in charge of sales earlier this year, has been elected president. *W. D. Jones* has been elected vice-president.

J. W. MORTELL COMPANY.—*T. P. Fitzpatrick* has been appointed vice-president and general manager, and *E. F. Gerrity* has been appointed sales manager.

INLAND STEEL COMPANY.—*Joseph L. Block*, executive vice-president of the Inland Steel Company, has been elected president, succeeding *Clarence B. Randall*, who has been named chairman of the board.

GARLOCK PACKING COMPANY.—The Detroit office of Garlock has been moved to new and larger quarters at 2781 East Grand boulevard, Detroit, and its status changed from that of a sub-branch to that of a regular district office. Under direction of *Edward M. Thomas, Jr.*, district manager, the office will serve the lower Michigan peninsula and parts of Indiana.

SHERWIN-WILLIAMS COMPANY.—*Robert H. Hill*, formerly assistant general manager of transportation sales, has been ap-



Robert H. Hill

pointed general manager of the transportation sales division, to succeed *C. B. Bull*, who is on leave of absence.

GENERAL STEEL CASTINGS CORPORATION.—*Chester H. Wright*, sales representative at Chicago, has been appointed district manager—sales at Chicago.

Mr. Wright joined General Steel Castings in 1936 and, until 1942, served in various capacities at the company's plant at Eddystone, Pa. Upon his return to

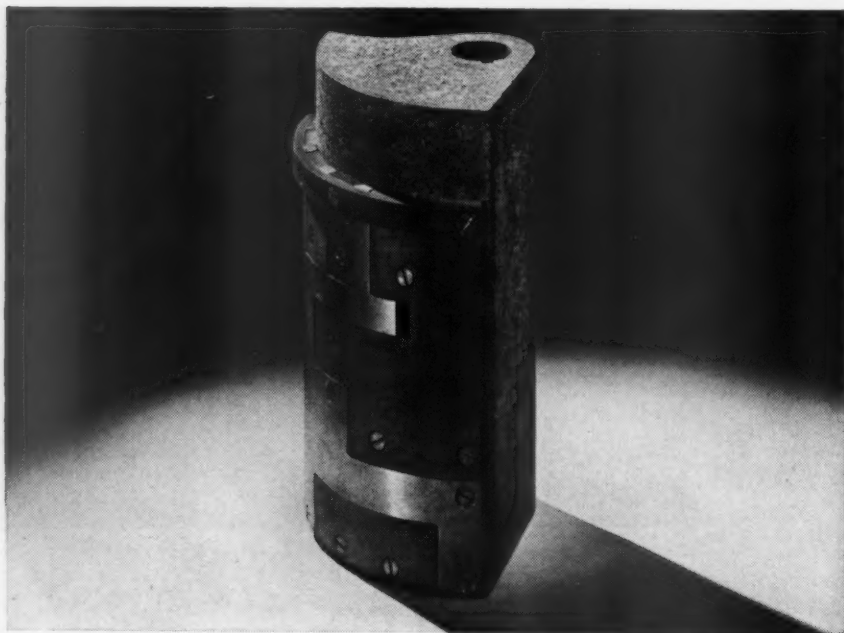


Chester H. Wright

Eddystone in 1946, after four years' in the Armed Forces, he became special apprentice. He worked in different plant departments, and became service representative and later, sales representative, joining the Chicago sales office in that capacity in 1947.

CARDWELL WESTINGHOUSE COMPANY.—*John A. King*, executive vice-president, has been named president, succeeding *Arthur E. Biddle*, deceased. *Lloyd Cardwell*, vice-president, succeeds Mr. King as executive vice-president. *C. J. Gorman*, sales representative, and *Ewart T. Evans*, assistant to president, have been named vice-presidents.

DEVILBISS COMPANY.—The fall week-long classes for foremen, shop, superintendents, maintenance supervisors, spray



A controller contact drum assembly, constructed of Celoron, Vulcanized Fibre and Brass.

A DRUM HARD TO BEAT!

Constructed of Celoron, Vulcanized Fibre and brass, this controller contact drum assembly controls a Diesel locomotive's speeds from stand-still to full speed. The two special C-D-F materials used — Celoron and Vulcanized Fibre — were chosen because of their unusual insulating and mechanical properties.

The drum body is molded C-D-F Celoron, a macerated canvas-filled phenolic material of superior electrical and mechanical strengths. C-D-F Vulcanized Fibre, a hard, dense, bone-like material . . . is between the contacts and enables the contact fingers to slide freely from metal to insulated surface. Fibre was specified because

of its unusual arc extinguishing and non-tracking characteristics. Whenever a circuit is broken, the resulting arc is drawn out across the surface of one of the Vulcanized Fibre segments, thereby protecting the surface of the phenolic drum from the arc.

Whenever you need superior insulating materials, call your C-D-F sales engineer. C-D-F branches are located in principal cities.

DIAMOND VULCANIZED TRACK FIBRE for rail joint insulation.

CELORON molded and machined high strength plastics.

MICABOND — bonded mica in tapes, sheets and special forms.

TEFLON tapes and sheets of a new high strength plastic resistant to high heat and moisture.

THE NAME TO REMEMBER. . . DIAMOND VULCANIZED FIBRE AND CELORON



Continental-Diamond Fibre Company
NEWARK 104, DELAWARE



Put your cleaning dollars on the Main Line!

Pennsalt Controlled-Power Cleaners for Railroad Maintenance

Surest way to get *full* value for your cleaning dollar is to take advantage of Pennsalt Cleaners and Pennsalt Service. Dozens of the nation's top roads do! Here's what they like about this outstanding line:

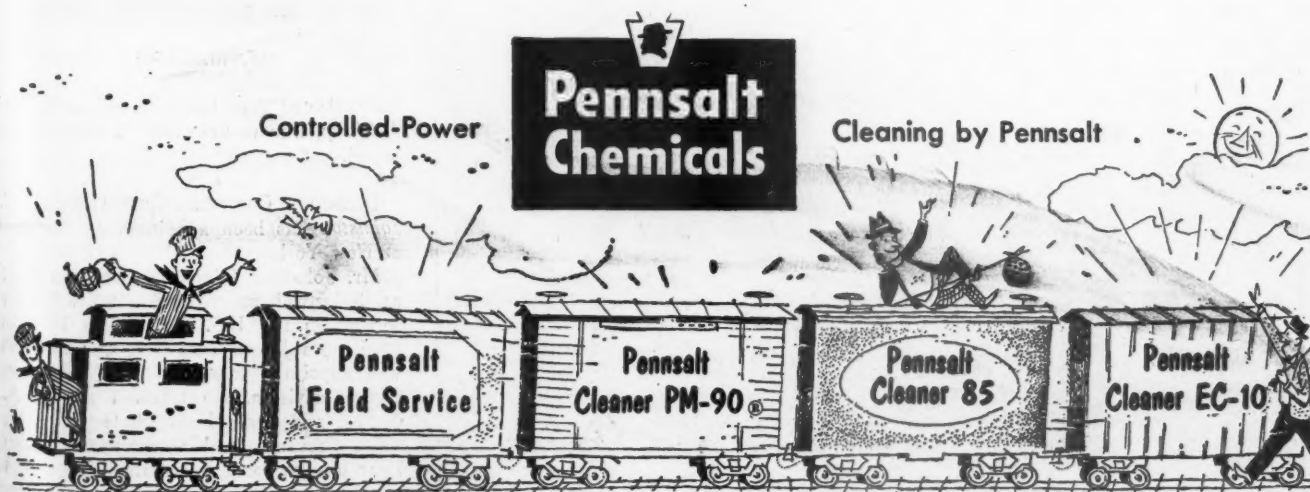
Every Pennsalt Railroad Maintenance Cleaner offers "Controlled-Power Cleaning." That means it has reserve strength to do the job thoroughly, yet with maximum safety to parts and equipment. And, of course, this reserve strength also makes for longer effective life of the cleaner.

A good example is Pennsalt Cleaner 45-X—the most versatile alkaline detergent offered for railroad cleaning. This well-buffered compound will provide long-life back shop cleaning

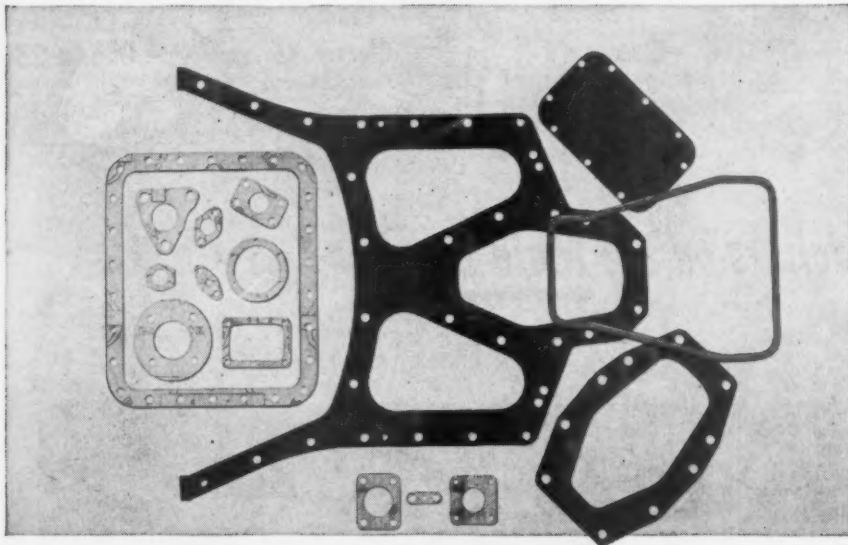
of filters, heads, and liners; and the detergent power for effective spray cleaning of running gear. In all, 45-X offers more and better cleaning for your maintenance dollar.

But that's true of *all* the cleaners in Pennsalt's complete line. Hard to believe? *We'll prove it—and right in your shop!* The Pennsalt Railroad Service Representative near you will gladly arrange a demonstration—let you see side by side comparisons of your present cleaners and Pennsalt cleaners. You be the judge!

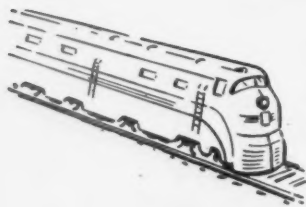
Write us today—for information, or a demonstration. Address: Maintenance Chemicals Dept., Pennsylvania Salt Manufacturing Company, 277 Widener Building, Philadelphia 7, Pa.



Available from **GARLOCK—**



Replacement gaskets for diesel locomotives



We can furnish direct from our factories in Palmyra, New York, high quality diesel locomotive gasketings in either sheet or gasket form. Garlock gaskets are standard equipment on many diesel locomotives.

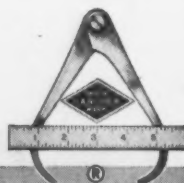
Three Garlock gasketing materials widely used on diesel locomotives are:

Cork-Fibre—	}	For oil at cold to medium temperatures
Vegetable-Fibre—		
Compressed Asbestos—		For hot oil and hot water

To order gaskets for your diesel locomotives, just call your Garlock representative.

THE GARLOCK PACKING COMPANY
PALMYRA, NEW YORK

In Canada: The Garlock Packing Company
of Canada Ltd., Toronto, Ont.



GARLOCK

PACKINGS, GASKETS, OIL SEALS,
MECHANICAL SEALS,
RUBBER EXPANSION JOINTS

operators, and others who wish to attend the industrial spray finishing course at the DeVilbiss School for Spray Painting will begin July 13, August 17, September 14, October 12, November 9, and December 7. Applications for School Form INS-753-A should be sent to the DeVilbiss Company, Toledo 1. The course is free.

DAYTON RUBBER COMPANY.—*Walt W. Hutchinson* has been appointed district manager, railway division with head-



W. W. Hutchinson

quarters in Cincinnati. Mr. Hutchinson will handle all railway accounts for the southeastern region.

ACME STEEL COMPANY.—*Fred M. Gillies*, executive vice-president at Chicago, has



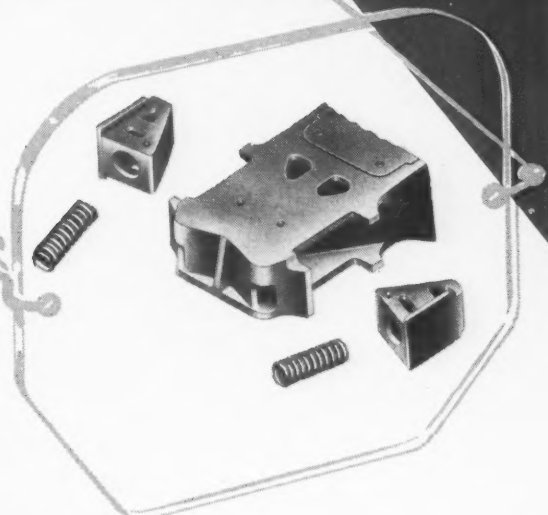
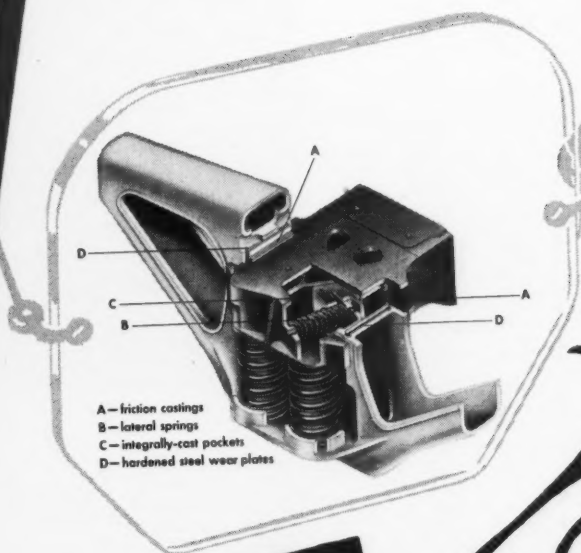
F. M. Gillies

been elected president. He succeeds *Carl J. Sharp*, who was elected chairman of the board.

DEARBORN CHEMICAL COMPANY.—*H. E. Johnston* has been appointed as manager at New York.

Mr. Johnston joined Dearborn in 1941 as industrial sales representative. After serving in the U.S. Army from 1943 to 1946, he rejoined Dearborn, and in 1950 was appointed manager, No-Ox-Id sales, eastern division. He received his B. A. degree from Pennsylvania State College in 1936. Previous to his employment with Dearborn he spent five years in industrial sales of the Sherwin-Williams Company.

BEFORE YOU SPECIFY ANY FREIGHT CAR TRUCK...



SEE THE

SCULLIN C-C TRUCK!

CONSTANT
CONTROL

See how the new C-C Truck's remarkably simple, compact, constant control assembly saves so much cost, weight and wear. See how it controls both lateral and vertical motion so efficiently, that the C-C set a Lading Damage Index ratio record of only .44 Vertical, only .43 Lateral in official A.A.R. road tests!



WRITE FOR DETAILS AND ENGINEERING DATA • SEE THE NEW C-C



NEW YORK
CHICAGO
BOSTON
SPRINGFIELD, MASS.

SCULLIN STEEL CO.

SAINT LOUIS 10, MISSOURI

*Here's
a retaining
device that
Stays put!*

FOUR contact points...
does not depend on
downward pressure
... complete coverage
"W" section front holds
back forward move-
ment! ... holds back
roll at tilted position.
CAN'T JUMP OUT!



THE PACKING WON'T STAY PUT IF
THE RETAINER JUMPS AROUND — THE

**IMPROVED
MODERN PACKING KEEPER**

IS DESIGNED TO DO THE JOB
AND STAY ON THE JOB!

Made in New dimensions to fit all sizes of
journal boxes. For further information, write:

MODERN RAILWAY DEVICES, INC.

80 E. JACKSON BLVD.,
CHICAGO 4, ILLINOIS

Obituaries

EDWARD C. BADEAU, in charge of the Special Publications Section of the International Nickel Company, and editor of



E. Badeau

Inco Magazine, died suddenly from a heart attack May 24. Mr. Badeau, who was 58, had been associated with International Nickel since April, 1929.

PERSONAL MENTION

Baltimore & Ohio

RALPH B. FISHER, regional master car builder at Pittsburgh, appointed assistant superintendent, car department, at Baltimore.

WILLIAM C. REISTER, general car foreman at DuBois, Pa., shops, appointed regional master car builder at Pittsburgh.

Canadian Pacific

A. J. VANIER appointed locomotive foreman at Prescott, Ont.

Chicago, Milwaukee, St. Paul & Pacific

F. W. BUNCE, superintendent motive power, appointed chief mechanical officer, with jurisdiction over locomotive, car and mechanical engineer organizations at Milwaukee.

F. A. UPTON, assistant superintendent motive power, appointed superintendent motive power at Milwaukee.

THEODORE MISHEFSKE, general road foreman of engines, appointed assistant superintendent motive power at Milwaukee.

A. M. HAGEN, master mechanic, appointed district master mechanic, with supervision over all locomotive matters in Milwaukee shops and roundhouses.

C. G. Benkendorf, assistant master mechanic, appointed shop superintendent.

H. R. DREW appointed master mechanic at Milwaukee.

Magnus Safety Valve for Diesel Locomotive Steam Generators

- GREATER ACCURACY
- LONGER LIFE
- NO STEAM LEAKAGE



Magnus
Fig. 391
Safety Valve

Escape of steam into the engine cab is completely eliminated with the Magnus Fig. 391 Safety Valve. Added new features assure greater accuracy, positive safety and low-cost service.

Designed primarily for use on diesel locomotive steam generators, it is easily adjusted, has top and bottom guided feather valve, special spring and valve alloys. It is adjustable for either 245 or 300 pound boilers.

For further information write . . .

• **MAGNUS BRASS MFG. CO.**
Subsidiary of National Lead Co.
525 READING ROAD, CINCINNATI 2, OHIO



**Threads 4 sizes of pipe
fast with 1 set of dies—
and it won't jam!**

RIDGID 65R PIPE THREADER

This popular 65R has saved millions of hours of threading time, and no wonder—its one set of self-contained high-speed dies adjust to 1", 1¼", 1½" or 2" pipe size in 10 seconds! Mistake-proof self-centering workholder sets instantly! And lead screw won't jam on workholder, kicks out automatically at standard thread length! You can't match it for fast easy pipe threading—buy it at your Supply House.

THE RIDGE TOOL COMPANY • ELYRIA, OHIO





LIKE ABRAHAM LINCOLN'S LEGS •

"After much thought," wrote Honest Abe in settling an argument about the proper length for a man's legs, "it is my considered opinion that a man's lower limbs . . . should be at least long enough to reach from his body to the ground."

Stackpole engineers feel much the same way about the proper life for diesel-electric brushes. Brushes, they believe, should be made to give the longest possible service consistent with good commutation and freedom from costly and unnecessary commutator wear.

And so this explains why Stackpole diesel-electric brushes are exceptionally "kind" to commutators! Their record of performance on twenty-one Class 1 railroads and many smaller ones proves beyond question their ability to keep commutators in service for exceptionally long periods. In some particularly difficult services, Stackpole brushes actually improved poor commutator conditions that developed when other makes of brushes were used. And life of the Stackpole brushes was entirely adequate!

STACKPOLE CARBON COMPANY
St. Marys, Pa.



STACKPOLE

diesel-electric BRUSHES

BRUSHES FOR ALL ROTATING
ELECTRICAL EQUIPMENT • BEARING MATERIALS • BRAZING FURNACE
BOATS • CARBON PILES • CLUTCH RINGS • CONTINUOUS CASTING
DIES • DASH POT PLUNGERS • FRICTION SEGMENTS • RAIL BONDING
MOLDS • RESISTANCE WELDING AND BRAZING TIPS • SEAL RINGS •
TROLLEY AND PANTOGRAPH SHOES • and dozens of carbon-graphite specialties

Fort Dodge, Des Moines & Southern
L. W. LAUGHLIN appointed chief electrical engineer at Boone, Iowa.

Fort Worth & Denver
F. A. SMERKE appointed superintendent motive power at Childress, Tex.

G. S. ROBERTSON, superintendent motive power at Childress, Tex., has retired.
Born: Scotland, April 20, 1887.

Career: Began as an apprentice ship fitter at Dundee, Scotland. In 1907 employed in building and repairing ships in the United States. Became associated with FW&D in 1910 as a boilermaker at Childress. From 1918 to 1948, successively, general boiler foreman and general foreman, in the latter year being appointed superintendent motive power.

New York Central
CAR MAINTENANCE (SYSTEM)
(Jurisdiction of F. C. Ruskaup, general manager, car maintenance)

G. R. GIVIDEN appointed assistant to general superintendent — passenger cars, with jurisdiction over passenger-car shops at West Albany and Beech Grove and passenger-car work at East Buffalo. Headquarters, New York.

P. R. OLIVER appointed assistant to general superintendent — repair tracks and train yards. Headquarters, New York.

Jurisdiction over freight-car shops at Avis, Pa., East Buffalo and Beech Grove, as well as heavy repair and project work at West Detroit, Linndale and Ashtabula, has been transferred to F. J. Kossuth, assistant to general superintendent — shops and projects.

(Jurisdiction of F. J. Kossuth, assistant to general superintendent—shops and projects.)

O. L. EASTON appointed superintendent of shop (East Buffalo car shop), with headquarters at East Buffalo, N.Y.

EQUIPMENT DEPARTMENT
(Jurisdiction of W. C. Wardwell, district manager—equipment, Lines East)

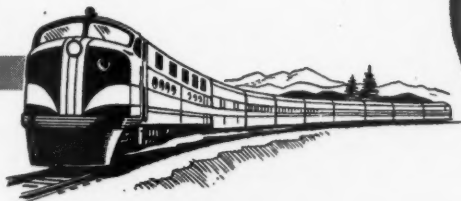
J. R. COONEY, assistant master mechanic at Syracuse, N.Y., appointed master mechanic—locomotive, with jurisdiction over the Buffalo and Pennsylvania Divisions and the Syracuse-Rochester Division to and including Rochester. Headquarters, Buffalo.

G. C. SCHREYER, assistant master mechanic at Buffalo, appointed assistant master mechanic—locomotive, with headquarters at Buffalo.

R. H. BUSDIECKER, assistant master mechanic (car) at Buffalo, appointed master mechanic—car, with jurisdiction over the Buffalo and Pennsylvania Divisions and the Syracuse-Rochester Division to and including Rochester.

J. A. WETZEL, superintendent shops (diesel) of the Boston & Albany at West Springfield, Mass., appointed master mechanic—locomotive, with jurisdiction over the Syracuse-Rochester Division east of Rochester, Mohawk Division, west of Schenectady, and Adirondack, St. Lawrence,

Here's the 4-stage Separator/Filter that removes water, dirt, and air from warm (Vis. 35SSU @ 122°F) or cold (10°F) Diesel fuel . . .



EXCEL-SO

SEPARATOR-FILTER-



Combination

AIR ELIMINATOR

**4-
STAGE**

There is a vast difference between the easy job of removing warm water, dirt, and pipe scale from warm diesel fuel (Vis. 35SSU @ 122°F) compared to the almost impossible job of removing cold water, or ice crystals, from cold, viscous diesel fuel @ 10°F. The 4-stage EXCEL-SO Separator/Filter is designed to operate under these conditions, more efficiently, at less operating expense, than conventional single-stage, or two-stage filters only.

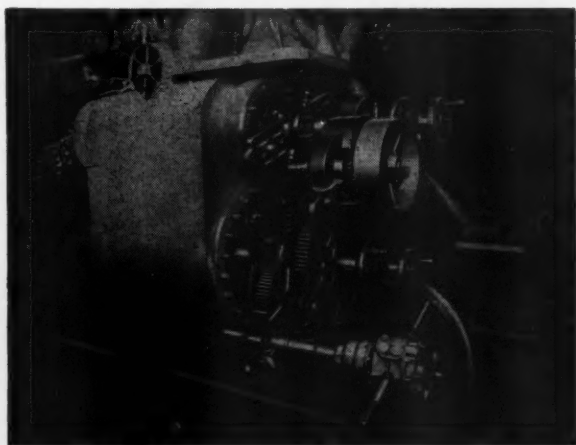
Send for Bulletin FEQ-51 or our engineers will gladly call upon request.

WARNER LEWIS COMPANY

BOX 3096 • TULSA, OKLAHOMA

UNDERWOOD PORTABLE MACHINE TOOLS

For Railway Shops and Engine Houses



Left: The Underwood Boring Bar illustrated is designed for rebores all sizes of locomotive cylinders and valve chambers.

Below: The Underwood Portable Crankpin Turning Machine returning crankpin in position.



OTHER UNDERWOOD TOOLS:

Portable Facing Arms
Rotary Planing Machines
Locomotive Cylinder or Dome Facing Machines
Portable Pipe Benders
Rotary Flue Cleaner

H. B. UNDERWOOD CORPORATION, PHILADELPHIA 23, PA., U. S. A.

and Ottawa divisions. Headquarters, Dewitt, N.Y.

M. P. METZGER appointed assistant master mechanic—locomotive, with headquarters at Dewitt, N.Y.

S. O. HUGHES, assistant master mechanic at Albany, appointed master mechanic—locomotive, with jurisdiction over Boston & Albany Railroad, River Division and Mohawk Division, Schenectady and east. Headquarters, Albany.

G. M. BEISCHER, assistant master mechanic at Harmon, N.Y., appointed super-

intendent of shop (diesel), with headquarters at West Springfield, Mass.

KARL F. MILLER appointed assistant master mechanic—locomotive, with headquarters at Albany.

V. T. BURNS appointed master mechanic—car, with jurisdiction over the Syracuse-Rochester Division east of Rochester, Mohawk division west of Schenectady, and Adirondack, St. Lawrence and Ottawa Divisions. Headquarters, Dewitt, N.Y.

J. E. DEFREEST, assistant master mechanic (car) at Albany, appointed master

mechanic—car, with jurisdiction over Boston & Albany Railroad, River and Mohawk divisions, Schenectady and east. Headquarters, Albany.

E. L. HYATT, master mechanic at Harmon, N.Y., appointed master mechanic—locomotive, with jurisdiction over the Hudson, Harlem, Putnam and Electric Divisions, New York Terminal district, and Grand Central Terminal. Headquarters, Harmon, N.Y.

F. E. EDWARDS, assistant master mechanic at Harmon, N.Y., appointed assistant masters at Harmon, N.Y.

E. S. MUSTAIN appointed assistant master mechanic—locomotive, with headquarters at Harmon, N.Y.

G. A. MILLER, division general car foreman at New York, appointed master mechanic—car, with jurisdiction over Hudson, Harlem, Putnam and Electric Divisions, Grand Central Terminal and New York Terminal district. Headquarters, Mott Haven, N.Y.

C. W. COLE appointed general inspector—car, with headquarters at New York.

Positions of master mechanic at Avis, Pa., division general car foreman at Mott Haven, N.Y., and assistant master mechanic—car, at Buffalo and Albany abolished.

(Jurisdiction of A. L. Wright and F. C. Ruskaup, general manager—locomotive and car maintenance, respectively.)

M. R. BENSON, superintendent equipment of the Michigan Central at Detroit, appointed district manager—equipment, with headquarters at Detroit. Former position abolished, also position of assistant superintendent of equipment at Detroit.

Reporting to Mr. Benson:

F. L. HOFFMAN, master mechanic at Buffalo, appointed assistant district manager—locomotive, with headquarters at Detroit.

J. J. LARSON, general car inspector at New York, appointed assistant district manager—car, with headquarters at Detroit.

R. F. CULBRETH, master mechanic of the Indiana Harbor Belt and the Chicago River & Indiana at Gibson, Ind., appointed master mechanic—locomotive, with jurisdiction from Ann Arbor west and north to Owosso, Mich. Headquarters, Jackson, Mich.

M. W. REUM, assistant master mechanic of the Michigan Central at Jackson, Mich., appointed master mechanic—car, with jurisdiction from Ann Arbor, Mich., west and north to Owosso, Mich. Headquarters, Jackson. Former position abolished.

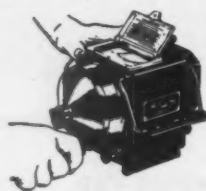
J. C. SHANNON, master mechanic of the Michigan Central at West Detroit, Mich., appointed master mechanic—locomotive, with jurisdiction from Ann Arbor, Mich., and east, Toledo, Ohio, and north to Mackinaw, Mich., including Owosso, Mich.

MEGGER ELECTRICAL INSULATION TESTERS

Ratings up to
2000 Megohms
and 1000
Volts DC

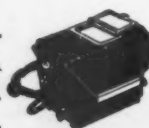
...in types to suit varying needs
of RAILROAD ELECTRICAL MEN
for Shop and Field Use

HAND CRANK MEG TYPE of Megger Insulation Tester is a reliable field instrument, light, sturdy, with a constant-voltage type generator—no dependence on batteries or other current supply. By far the most popular instrument among electrical plant maintenance men. Easy to use—easy to read—and rugged in constant services. **BULLETIN 21-45-X.**



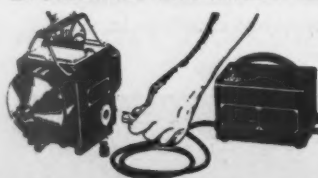
RECTIFIER OPERATED MEG TYPE

of Megger Insulation Tester simply plugs into a convenient outlet. Portable or flush bench-mounted. A dependable production or inspection instrument. Quick, easy readings speed up otherwise costly tests.



DUAL-OPERATED MEG TYPE

of Megger Insulation Tester may be operated by hand or rectifier. Excellent solution for those requiring a versatile instrument for field and bench use.



BULLETIN 21-46-X

JAMES G. BIDDLE CO.

ELECTRICAL TESTING
INSTRUMENTS

SPEED MEASURING
INSTRUMENTS

LABORATORY & SCIENTIFIC
EQUIPMENT

1316 ARCH STREET, PHILADELPHIA 7, PA.

James G. Biddle Co.
1316 Arch St., Phila. 7, Pa.

Gentlemen:

Please send me material checked:

☐ 21-45-X

☐ 21-46-X

NAME

JOB FUNCTION

COMPANY

ADDRESS



Like Lightning! MURPHY SPRAYERS

Clean DIESEL and all locomotive engines with—

- CORNMEAL
- CRUSHED CORN COBS
- OR ANY DETERGENT

(Pipe) sizes — $\frac{1}{16}$ ", $\frac{1}{8}$ ", $\frac{1}{4}$ ", $\frac{3}{8}$ ", $\frac{1}{2}$ ". Prices \$12.00 to \$18.00. Write for literature.

JAS. A. MURPHY & CO., INC.

Manufacturers of Separators, Aftercoolers and Traps
1421 High St. • Hamilton, Ohio



Get 'em while they're hot!

It's C&D's new descriptive bulletin—to make the job of buying and specifying carlighting and air-conditioning batteries easier. It's chock-full of details and specifications. Write for your copy of Bulletin AC-546.



BATTERIES, INC.
of Conshohocken, Pa.
402 WASHINGTON STREET

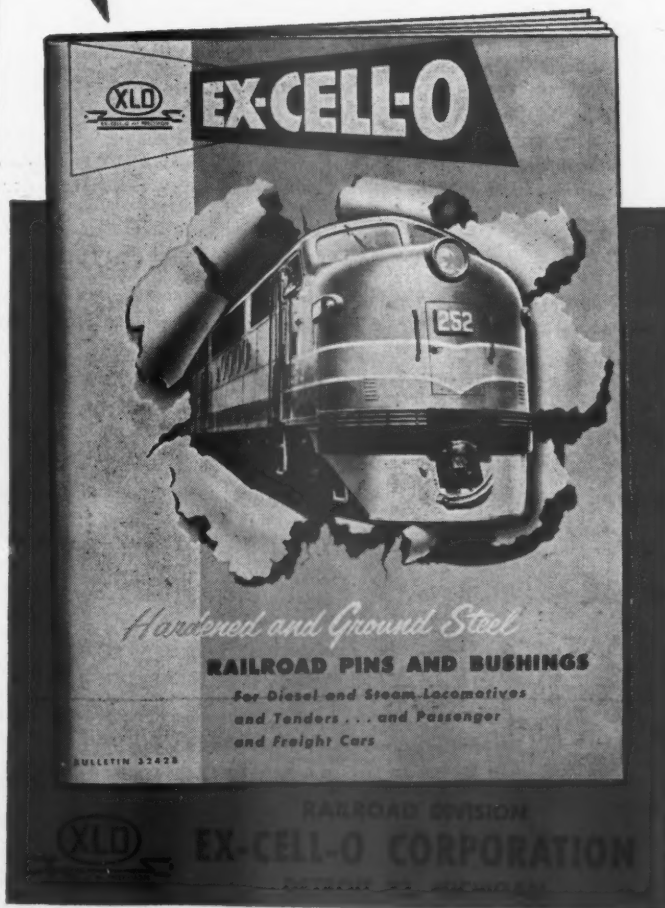
NEW CATALOG OF HARDENED AND GROUND STEEL PINS AND BUSHINGS

Have within easy reach this catalog of STANDARD SIZES AND STYLES of Ex-Cell-O's long-service-life pins and bushings.

Ex-Cell-O heat treatment gives an extremely hard surface for wear resistance, a tough ductile core to withstand shocks and vibration. Over 200 railroads and equipment builders depend on Ex-Cell-O hardened and ground steel Pins and Bushings.

SEND FOR IT

Write to Ex-Cell-O for Bulletin 32428



Use Just 1 Cleaner for ALL your grease chasing jobs!



**For Engine Pits... Diesel Engine Rooms...
Trucks... Concrete Floors**

Use Diesel Magnusol. Mixed with kerosene, diesel oil or safety solvent, it makes a cleaning solution that is sprayed on the surfaces to be cleaned. As it soaks in, it digs rapidly into the dirt, loosens the bond of the dirt with the surfaces being cleaned, and puts the dirt deposit in condition for rinsing away. After a soak-in period of a few minutes, you flush surfaces with water. The water forms an emulsion with the solution, which floats away all the dirt, leaving surfaces thoroughly clean, even in areas where hand work cannot reach. You don't have to heat Diesel Magnusol cleaning solution or the rinse water, although you can use a steam gun for flushing away.

Safe for Paint, Metals and Personnel

Diesel Magnusol makes a completely **SAFE** cleaning solution... non-flammable... non-toxic... fumeless... with no harmful action on human skin or on painted or varnished surfaces.

Put it to work for a Month!

Order a trial drum of Diesel Magnusol. Use it according to our directions for a month. If you are not completely satisfied, we will cancel the full invoice!



Railroad Division
MAGNUS CHEMICAL CO., INC.
77 South Avenue, Garwood, N. J.
In Canada—Magnus Chemicals, Ltd., Montreal
Representatives in All Principal Cities

J. W. HESPEN, assistant master mechanic of the Michigan Central at West Detroit, Mich., appointed master mechanic—car, with jurisdiction from Ann Arbor and east, Toledo and north to Mackinaw, Mich., including Owosso, Mich., and Detroit passenger yards. Former position abolished.

E. J. O'BRIEN, assistant master mechanic of the Michigan Central at Niles, Mich., appointed general car foreman at Niles. Former position abolished.

C. J. MARPLE, assistant master mechanic of the Michigan Central at St. Thomas, Ont., appointed general car foreman at St. Thomas. Former position abolished.

H. R. FRIEL, chief electrical and diesel supervisor of the Michigan Central at Detroit, appointed chief diesel supervisor, with headquarters at Detroit. Former position abolished.

E. F. STARK, general locomotive inspector of the Michigan Central at Detroit, appointed chief electrical supervisor, with headquarters at Detroit. Former position abolished.

Northern Pacific

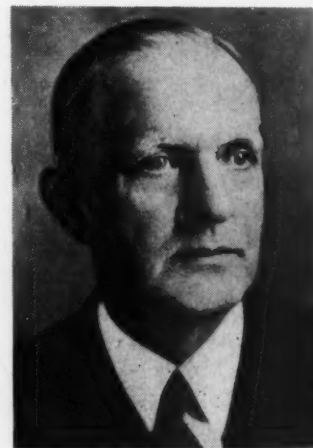
H. E. BRAKKE, mechanical engineer, appointed assistant superintendent, car department, at St. Paul, Minn.

D. T. CAPISTRANT, car foreman at Como shops, St. Paul, appointed assistant shop superintendent at St. Paul.

H. B. HOESLY, engineer of tests, appointed mechanical engineer, with headquarters at St. Paul, Minn.

L. O. HANSON, assistant to engineer of tests, appointed assistant engineer of tests, with headquarters at St. Paul.

Norfolk & Western



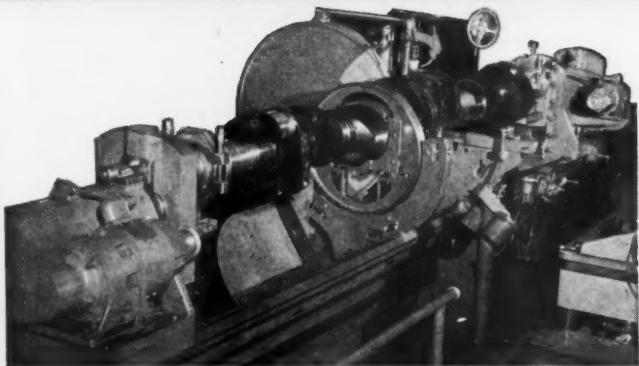
H. W. Reynolds

H. W. REYNOLDS, mechanical engineer, has retired.

Born: May 24, 1883.

Career: Joined N&W in 1905 after working in the test department of the American Locomotive Works in Richmond, Va. Promoted from draftsman to mechanical inspector in 1918, inspecting locomotives built for the N&W by outside companies. Appointed foreman at Bluestone in 1924; assistant general foreman in 1927; assistant mechanical engineer at Roanoke in 1938, and mechanical engineer later in the same year.

CRANKSHAFT GRINDING SERVICE



Established 1924
... 28 years experience grinding crankshafts! The most complete engine rebuilding shop in the Southwest!

THE LARGEST CRANKSHAFT GRINDING MACHINE IN THE WORLD USED IN AN INDEPENDENT REPAIR SHOP

- ★ HARD CHROMIUM PLATING SERVICE
- ★ CRANKSHAFT STRAIGHTENING SERVICE
- ★ MAGNAFLUX SERVICE

Four machines giving range from the smallest up to crankshafts with stroke of 16" and 200" O.A.L. Complete grinding service for locomotive, stationary, marine, automotive and compressor crankshafts. Undersized journals restored to size by hard chromium plating.

NATIONAL WELDING & GRINDING CO.

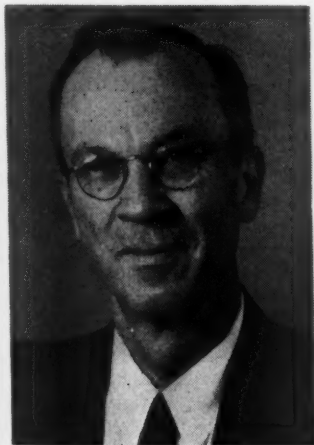
2929 CANTON ST.

DALLAS 1, TEXAS

G. P. McGAVOCK, assistant mechanical engineer, appointed mechanical engineer at Roanoke.

Education: Engineering school, Cornell University.

Career: Helper machinist at Roanoke shop during summer of 1917. Became a draftsman a few months later and, after



G. P. McGavock

three furloughs to complete engineering school, returned to the railway in July 1922 as a machinist. Appointed draftsman in superintendent of motive power's office in 1922; chief draftsman in 1938, and assistant mechanical engineer in 1938.

H. L. SCOTT, JR., shop inspector in

Roanoke shops, appointed gang foreman in electrical shop.

A. R. SLUSHER, shop engineer, appointed to newly created position of shop facility engineer.

HARVEY L. UNDERWOOD, JR., appointed assistant foreman car repairs at Knoxville, Tenn.

Southern

ED B. TURPIN, JR., appointed road foreman of engines at Somerset, Ky.

SAM G. CUNNINGHAM appointed assistant foreman enginehouse at Knoxville (Sevier), Tenn.

SCOTT A. COFLIN appointed assistant foreman enginehouse at Monroe, Va.

WALTER D. KELLY appointed assistant foreman enginehouse at Spencer, N.C.

JOHN W. COLEMAN, JR., appointed assistant foreman machine shop, Coster shop, Knoxville, Tenn.

MILTON T. CORLEY appointed assistant foreman enginehouse at Columbia, C.C.

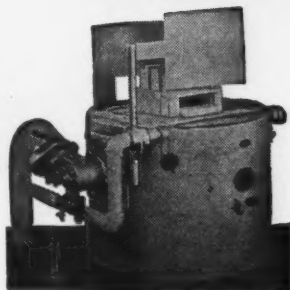
GEORGE M. WALTON appointed foreman (night) at Winston-Salem, N.C.

JESSE O. BROWN, JR., appointed assistant foreman at Hayne car shop, Spartanburg, S.C.

WILLIAM C. WILLIAMS appointed assistant foreman at Hayne car shop, Spartanburg, S.C.

Full Fire *INSTANTLY*
Without Smoke

...with a **JOHNSTON**



Oil Burning BLACKSMITH FORGE!

SAVE TIME with a Johnstone Blacksmith Forge! Eliminate costly lost time in handling coal and ashes. Parts are easily and quickly positioned, and removed for inspection.

Increase production—lower costs with a new Johnstone Oil Burning Blacksmith Forge!

ASK FOR CATALOG R 301

OVER THIRTY YEARS EXPERIENCE IN FURNACE DESIGN AND MANUFACTURE
BURNERS—BLOWERS—FURNACES—RIVET FORGES—
FIRE LIGHTERS—TIRE HEATERS



JOHNSTON

MANUFACTURING CO.
2825 EAST HENNEPIN AVE
MINNEAPOLIS 13, MINN

ENGINEERS & MANUFACTURERS OF INDUSTRIAL HEATING EQUIPMENT

New Devices

(Continued from page 88)

eral Electric Company's Lighting and Rectifier Department.

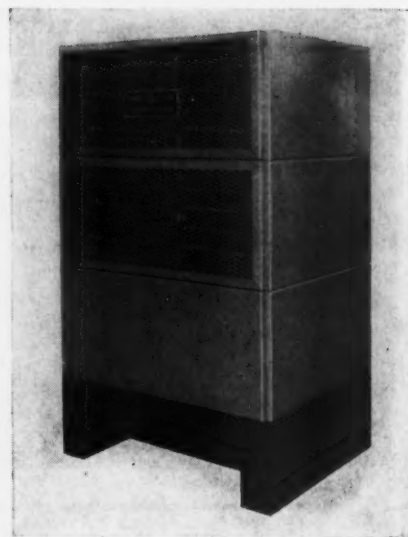
Incorporating a number of advances in operating convenience and efficiency, the new equipment is substantially lower in price than former units because of the extensive use of interchangeable standardized components.

The line includes manually-controlled (like the unit shown in the illustration) and automatically-regulated power supplies,

as well as special equipment for barrel plating and precision laboratory work. Maximum operating economy in each rating is achieved by using a variety of circuits and either copper-oxide or selenium rectifier stacks, depending on the output desired.

Direct current ratings for the new manually and automatically regulated systems range from 500 amp. at 6 volts to 2,000 amp. at 48 volts. Units for barrel plating are available in ratings from 500 amp. at 6 volts to 2,000 amp. at 12 volts. Laboratory platers are rated 50 amp. at 9 volts and 65 amp. at 18 volts.

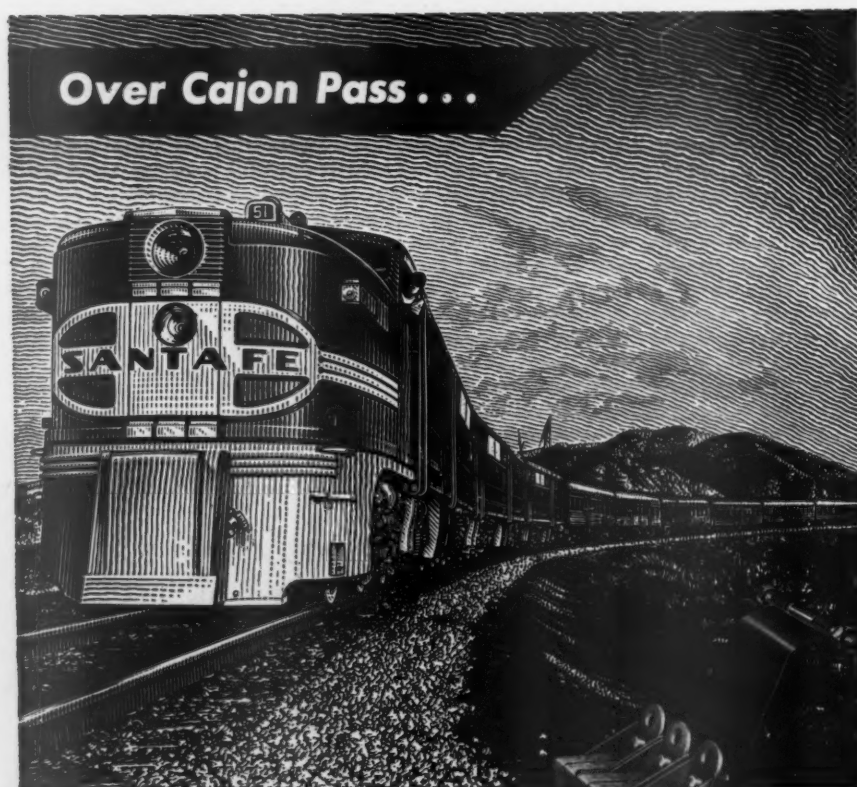
Saturable reactor control is employed on



manually and automatically-regulated power systems. A single operator's control station, for mounting beside the plating tank or adjacent to the rectifier units, controls the entire d.c. output of the system regardless of the number of individual units employed. Manually-controlled systems of the line may be converted at any time to automatic regulation. This is accomplished by adding an additional section to one of the existing units to regulate voltage or current, or for anodizing control.

In lower ratings, controls and rectifiers are housed in the same wall-mounted cabinet. Larger ratings are floor-mounted, and employ unit construction for ease of shipment and installation. No special foundations are required.

Where especially corrosive atmospheres will be encountered, power supplies using oil-immersed selenium stacks are available.



... with FELPAX Lubricators helping maintain fast schedule

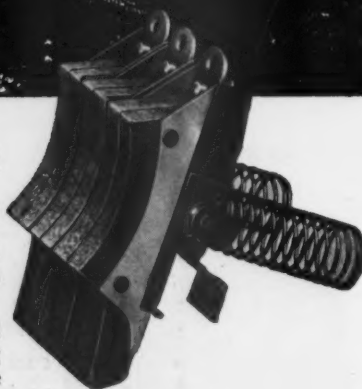
Tough hauls plus high speeds combined in the Santa Fe route through Cajon Pass demand dependable equipment.

That's why FELPAX lubricators are used to provide dependable suspension bearing lubrication. With the first turn of the wheels, and at high speeds, the bearings receive full lubrication through special felt wicks that last for thousands of miles. Old fashioned yarn packing that caused waste grabs and starved bearings is eliminated.

Your suspension bearing lubrication problems can be solved, too, with modern FELPAX Lubricators.

For full information on modern FELPAX Lubricators see your locomotive builder or write to:

MILLER FELPAX CORPORATION
WINONA MINNESOTA



the lubricator
that eliminates
repacking



Lift Truck Has Electric Transmission

The Automatic Transportation Company, Chicago, is now introducing a "Dynamotive" gasoline-engine-driven lift truck with electric transmission and modern lines designed to be utilitarian as well as attractive. This is said to be the first gas-powered industrial truck with electric transmission and it will be shown at the Fifth National Materials Handling Exposition in Philadelphia, May 18-22. Power is supplied to the two large forward wheels and steering by the smaller wide-tread rear wheels.

The electric transmission displaces torque converters, clutch, overdrive mechanisms, and gear shifting, thereby promoting efficient operation and reducing out-of-service time for repairs, as well as the cost, of these parts. Fully-controlled power is assured with infinite speed change and minimum power loss. Since there is no mechanical connection between engine and wheels, transmission shock loads to the engine are entirely eliminated, thus assuring maximum engine life.

Advantages gained from the modern design are said to include: Greater safety and driver comfort; better vision from the

NO *Time Out* FOR THIS LOCOMOTIVE

The engineman spots a leaky cylinder flange joint. With a Rooksby Portable Flange Facing Machine, the joint is quickly refaced — *without removing the piston from the cylinder*. The engine leaves the roundhouse right on schedule.

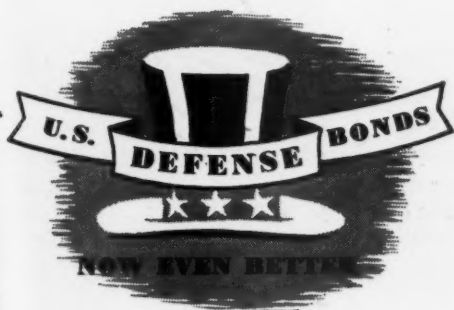
Rooksby Portable Machine Tools provide a valuable, time-saving "working kit" for roundhouse or shop. They are quickly set-up and perform a variety of useful jobs accurately and dependably. These Rooksby products mean more road time for your locomotives—Cylinder Boring Bars—Valve Chamber Boring Bars—Crank Pin Turning Machines—Cylinder Flange Facing Machines.



ROOKSBY *Portable* MACHINE TOOLS

E. J. ROOKSBY & CO.

1042 Ridge Ave., Philadelphia 23, Pa.



Sweeney
POWERENCH
TOOLS

for
diesel
engine
maintenance

NO. 380 ALCO COMBINATION SET—
loosens or tightens Main Bearing Cap
Nuts to exact specifica-
tions of engine manu-
facturer... brings work
out of hand hole... as-
sures correct torque on
all nuts.

7R6 Send me information on complete
line of Sweeney POWERENCH Tools.

Name _____

Address _____

City _____ State _____

B. K. SWEENEY MFG. CO., DENVER 17, COLO.

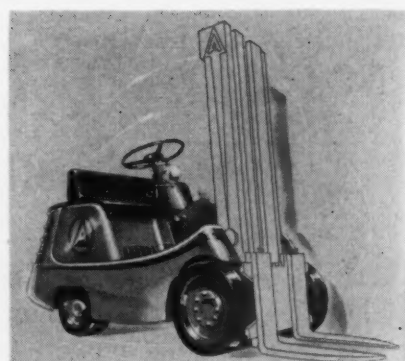
driver's seat; a full-size bench-type seat; extra leg room; centralized controls; and grouping of all instruments on the steering post column. Rear contours have been shortened, reducing aisle projections and contributing to over-all operating efficiency as well as appearance.

An unusual safety feature is secured by interlocking the hydraulic service wheel brakes with emergency disc brakes in such a manner that instantaneous application of the emergency brakes is attained by the same pedal in case of hydraulic brake failure.

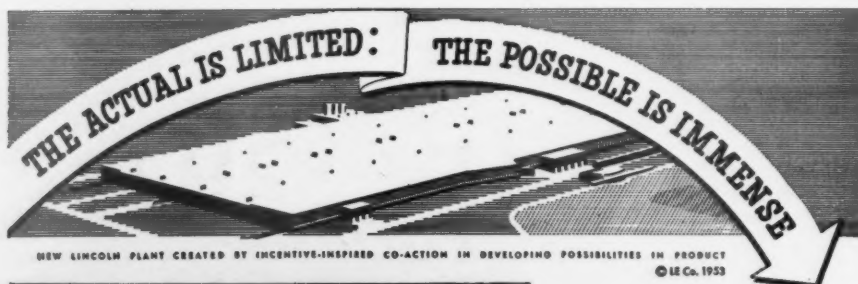
Ease of maintenance and exceptional accessibility of engine also results from design and styling factors. All parts not requiring quick or frequent access are shielded, for greater cleanliness, and at the same time protected against damage. For servicing, the hood hinges forward, disclosing the entire engine compartment.

The truck is extremely low in chassis height which promotes stability. Gages on the cluster-type instrument panel measure amperage, temperature, oil pressure, and fuel level.

A new optional feature is a load indi-



"Dynamotive" gas-powered lift truck with electrical transmission.



LINCOLN 200 amp "SHIELD-ARC" engine driven welder mounted on two wheel trailer gets to the job fast . . . to eliminate costly man-hours waiting for equipment. Famous Lincoln Dual Continuous Control with Job Selector gives the *right arc* and *right arc intensity* for quality welding in all positions . . . faster, easier. Photo below shows typical repair to freight car speeded with welding team of Lincoln "Shield Arc" and "Fleetweld 7" electrode.



SPEEDS YARD REPAIR TO CUT MAINTENANCE COSTS

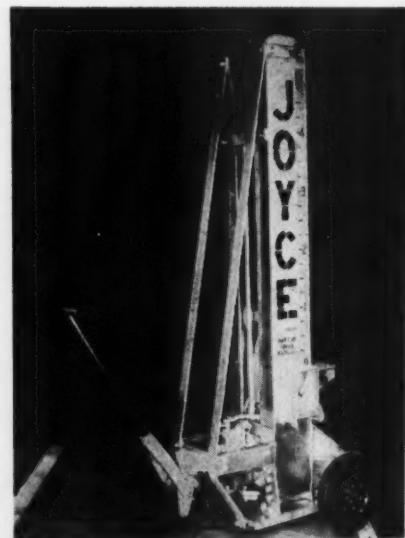
CAR repair shops prefer "Shield Arc" for its economy of operation . . . its dependability for quality and strength on every weld. For whether it's flat, vertical or overhead welding, instant selection of the right type arc and right arc intensity with "Shield Arc's" Dual Control simplifies the weld . . . gets the job out of the yard in the shortest time and at lowest cost.

GET THE FACTS

Learn how to simplify welding and cut costs with Lincoln's "Shield Arc". Details in Bulletin 1313. Write on your letterhead to The Lincoln Electric Railway Sales Co., 11 Public Square, Cleveland 13, Ohio. Railroad representatives of

THE LINCOLN ELECTRIC COMPANY
CLEVELAND 17, OHIO

THE WORLD'S LARGEST MANUFACTURER OF ARC WELDING EQUIPMENT



Diesel Locomotive Jack

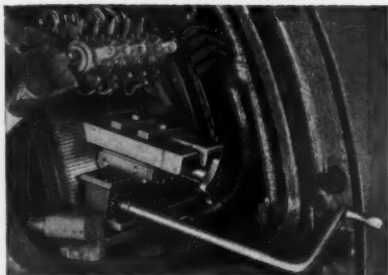
An air operated jack, designated as Model 35 HL, to fill the need for portable lifting equipment required to make truck and traction motor changes, center plate inspections, has been introduced by Joyce-Gridland Company, Dayton 3, Ohio.

Weighing only $\frac{1}{2}$ as much as existing jacks of 35-ton lifting capacity, it can be moved and operated by one man. Aluminum alloys are utilized in its frame while internal mechanism and gearing is constructed of high alloy steel. All motor parts and intermediate gears are interchangeable with standard Joyce, air operated jacks.

Total weight of the unit is 1255 lb. It has a lifting height of 4 ft., 4 $\frac{1}{2}$ in. and it can be used in lifting engines, freight cars, passenger cars and diners.

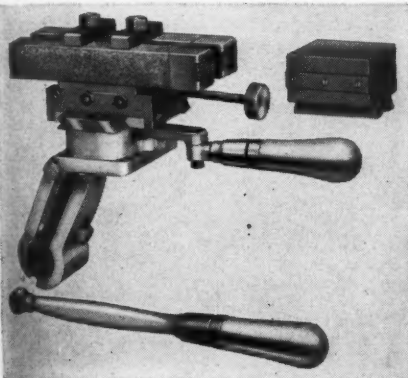
MARTINDALE

DIESEL-ELECTRIC COMMUTATOR MAINTENANCE EQUIPMENT COMMUTATOR GRINDER



New design makes resurfacing of Diesel-electric commutators more accurate, easier, faster. Carriage is chain-driven, travels on ball-bearings. Adapters for mounting grinder on virtually all models of Diesel generators and motors are also furnished.

TYPE C COMMSTONE HOLDER



Holds Commstones rigid and true for concentric resurfacing of smaller Diesel-electric commutators such as auxiliary generators and amplidyne exciters. Mounts on brush arm by means of an adjustable support.

MICA-MILLER UNDERCUTTER



A powerful, light-weight, low cost, easy to use Undercutter, operating from 1/5 h.p. Universal motor. Available with small, medium or heavy-duty head (interchangeable). Also available with air motor or flexible shaft drive.

Send for new 64-page Catalog No. 29 of Maintenance, Production and Safety Equipment.

MARTINDALE ELECTRIC CO.

1337 Hird Ave. Cleveland 7, Ohio

Lightweight Electric Drill

This low-priced addition to the Thor line of tools is small, lightweight and is said to be streamlined for fast and easy operation. Called the 1/4 in. Copper Line Electric Drill, and featuring pistol grip operation, the unit is made by the Independent Pneumatic Tool Company, Aurora, Ill.

The drill is furnished with either geared chuck or keyless chuck. It weighs 2 3/4 lb. and measures 7 7/8 in.

Construction details include handle and field case cast in one piece, separate cover for switch mounting. Its switch is of the momentary type with trigger lock pin for continuous operation. A baffle plate and centrifugal fan assure cool operation.

All Purpose Cleaning Spray

An industrial cleaner that removes grease, oil, wax, gums, dirt, dye, ink, cutting soap, light carbon, etc., without injury to metals, plastics, rubber, porcelain, composition, concrete or wood, has been marketed. Designed as First Universal Cleaner, it is manufactured by Kelite Products, Inc., Los Angeles 12.

Applied by a hand-sized pressure spray gun, the formulation accomplishes cleaning without heat, odor, fumes, solvents, fire-hazard or danger to the skin.

Virtually all cleaning operations are performed by spraying the compound on the stained surface and wiping-off. Hard rubbing or scouring are said to be seldom required. The spray gun is charged with air pressure, can be refilled in a few seconds and contains enough Spray White for several hours of average cleaning.

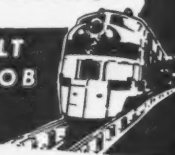


The pistol sprayer developed by James A. Murphy & Co., Hamilton, Ohio, is a cleaner for generators and engines, using ground corn cobs and cornmeal. The sprayer comes complete with a suction hose and operates with a simple finger control.

IDEAL

SHORTCUTS to better commutator maintenance

QUALITY-BUILT
TO DO THE JOB
RIGHT! . . .



The easiest way to restore commutators in traction motors and generators without dismantling during interim maintenance...or during periodic overhauls. IDEAL Resurfacers and other tools are used by leading railroads and recommended by locomotive builders.

RESURFACERS



Refinish commutators to like new condition even when ridged, scored or burned. Wood block handles clamp rigidly into grinder. Seven sizes, in all grades from extra coarse to extra polish.

MICA UNDERCUTTERS



Work easily in close quarters. Several models. Direct drive or by flexible shaft.

For use with IDEAL Commutator Saws and Milling Cutters.

FLEXIBLE ABRASIVE

Cleans and burnishes commutators. Non-dusting. Complete size range.

CLEANER-BLOWERS



Blows air at high velocity and harmless low pressure. Light-weight and rugged. May also be used as a vacuum cleaner or sprayer. Three models: 1/2, 3/4 and 1 1/2 H.P.

FREE 39-page Handbook
Complete information on
commutator maintenance.
Mail coupon.

IDEAL Products Are Sold through
Leading Distributors



IDEAL INDUSTRIES, Inc.
1563 Park Avenue, Sycamore, Illinois

Send FREE Handbook and catalog sheets on:

☐ Resurfacers ☐ Flexible Abrasive
☐ Undercutters ☐ Cleaner-Blowers

Name _____

Title _____

Company _____

Address _____

City _____ Zone _____ State _____

-ADVERTISERS IN THIS ISSUE-

Adams & Westlake Co., The	32	Lord Manufacturing Co.	91
Agency—Henri, Hurst & McDonald		Agency—Davies & McKinney Advertising	
American Brake Shoe Company, National Bearing Division	10, 11	Magnus Brass Mfg. Co., Subsidiary of National Lead Company	101
Agency—Fuller & Smith & Ross, Inc.		Agency—The S. C. Baer Company	
American Chain & Cable	8	Magnus Chemical Company	106
Agency—Reincke, Meyer & Fynn, Inc.		Agency—Spooner & Kriegel	
American Locomotive Company	34, 35	Magnus Metal Corporation, Subsidiary of National Lead Company	31, 44
Agency—G. M. Basford Company		Agency—Richard & Company, Inc.	
American Locomotive Company, Railway Steel-Spring Division	9	Martindale Electric Co.	111
Agency—Hazard Advertising Company		Agency—Kenneth H. Kolpien	
American Steel Foundries	26, 27	Master Lubricants Company	89
Agency—Erwin, Wasey & Company, Inc.		Agency—Edward S. Kellogg Co.	
American Steel & Wire Division	6, 7	Met-L-Wood Corporation	83
Agency—Batten, Barton, Durstine & Osborn, Inc.		Agency—Armstrong Advertising Agency	
American Tool Works Co., The	37	Miller Felpax Corporation	108
Association of Manufacturers of Chilled Car Wheels	18	Agency—F. H. Faber Advertising, Inc.	
Agency—Schuyler-Hopper Co.		Modern Railway Devices, Inc.	100
Biddle Co., James G.	104	Agency—W. S. Kirkland Advtg.	
Agency—The Roland G. E. Ullman Organization, Inc.		Murphy & Co., Inc., Jas. A.	105
Buffalo Brake Beam Co.	Inside Front Cover	National Bearing Division, American Brake Shoe Company	10, 11
Bullard Company, The	25	Agency—Fuller & Smith & Ross, Inc.	
Columbia-Geneva Steel Division	4, 5, 6, 7, 36	National Carbon Company, Division Union Carbide and Carbon Corporation	Inside Back Cover
Agency—Batten, Barton, Durstine & Osborn, Inc.		Agency—William Esty Company, Inc.	
Consolidated Machine Tool Corporation	21	National Tube Division	6, 7, 36
Continental-Diamond Fibre Company	96	Agency—Batten, Barton, Durstine & Osborn, Inc.	
Agency—Geare-Marston, Inc.		National Welding & Grinding Co.	107
C & D Batteries, Inc.	105	Agency—Marvin Winsett Advertising Agency	
Agency—Richard A. Foley Advtg.		Oakite Products, Inc.	1
Dayton Rubber Company	Back Cover	Agency—Richard & Company, Inc.	
Agency—Geyer, Newell & Ganger, Inc.		Oxweld Railroad Service Company, Division of Union Carbide and Carbon Corporation	33
Dearborn Chemical Company	81	Agency—J. M. Mathes, Inc.	
Agency—The Buchen Company		Pennsylvania Salt Manufacturing Company	97
Dow Corning Corporation	23	Agency—Geare-Marston, Inc.	
Agency—Don Wagnitz		Railway Steel-Spring Division, American Locomotive Company	9
Edison Storage Battery Division of Thomas A. Edison Incorporated	30	Agency—Hazard Advertising Company	
Agency—Ketchum, MacLeod & Grove, Inc.		Ridge Tool Company, The	101
Elastic Stop Nut Corporation of America	29	Agency—Carr Liggett Advertising Agency	
Agency—G. M. Basford Company		Rooksby and Company, E. J.	109
Electric Storage Battery Company, The	43	Scullin Steel Co.	99
Agency—Geare-Marston, Inc.		Agency—Batz-Hodgson-Neuwoehner Advertising Agency	
Eso Standard Oil Company	41	Shell Oil Company	20
Agency—McCann-Erickson, Inc.		Agency—J. Walter Thompson Company	
Ex-Cell-O Corporation	105	Simmons-Boardman Publishing Corporation	109
Agency—Holden, Clifford, Flint, Inc.		Simplex Wire & Cable Co.	14
Fairbanks, Morse and Co.	12	Spicer Manufacturing Division of Dana Corporation	17
Agency—The Buchen Company		Agency—Clifford A. Kroening, Inc.	
Franklin Balmar Corporation	16	Stackpole Carbon Company	102
Agency—G. M. Basford Company		Agency—The Harry P. Bridge Co.	
Garlock Packing Company	98	Sweeney Mfg. Co., B. K.	109
Agency—Hutchins Advertising Company, Inc.		Agency—Curt Freiberger & Co.	
General Electric Company	34, 35, 79	Tennessee Coal & Iron Division	4, 5, 6, 7
Agency—G. M. Basford Company		Agency—Batten, Barton, Durstine & Osborn, Inc.	
General Steel Castings	87	Texas Company, The	39
Agency—Oakleigh R. French & Assoc.		Agency—Erwin, Wasey & Co., Inc.	
Gould-National Batteries, Inc.	28	Timken Roller Bearing Company, The	93
Agency—Hutchins Advertising Company, Inc.		Agency—Batten, Barton, Durstine & Osborn, Inc.	
Gulf Oil Corporation	95	Underwood Corporation, H. B.	103
Agency—Young & Rubicam, Inc.		Unit Truck Corporation	Inside Front Cover
Gulf Refining Company	95	United States Rubber Company	19
Agency—Young & Rubicam, Inc.		Agency—Fletcher D. Richards, Inc.	
Hyatt Bearings Division, General Motors Corporation	85	United States Steel Corporation	4, 5, 6, 7, 36
Agency—D. P. Brothers & Co.		Agency—Batten, Barton, Durstine & Osborn, Inc.	
Ideal Industries, Inc.	111	United States Steel Export Company	4, 5, 6, 7, 36
Agency—Glenn-Jordan-Stoetzel, Inc.		Agency—Batten, Barton, Durstine & Osborn, Inc.	
Irrington Varnish & Insulator Co.	13	Walworth Company	24
Agency—Franklin Fader Co.		Agency—G. M. Basford Company	
Johnston Manufacturing Co.	107	Westinghouse Air Brake Co.	2
Agency—E. W. Sann and Associates		Agency—Batten, Barton, Durstine & Osborn, Inc.	
Johns-Manville	22	Wine Railway Appliance Co., The	Front Cover
Agency—J. Walter Thompson Company		Agency—Beeson-Reichert, Inc.	
Lewis Bolt & Nut Company	112	Wix Corporation	15
Agency—Ruthrauff & Ryan, Inc.		Agency—Humbert & Jones	
Lewis Company, Warner	103		
Agency—Paul Locke Advtg.			
Lincoln Electric Company, The	110		
Agency—Gristwood-Eshleman Co.			

Lewis sealtite car bolts

More than 85% of America's Class I railroads use Lewis Sealtite products. Designed to do a better job . . . to last longer . . . to meet the most exacting specifications. Specify Hot Dip Galvanized, Zinc finish for Double-Life and economy.

Lewis BOLT & NUT COMPANY
504 Malcolm Ave. S. E.
MINNEAPOLIS 14, MINNESOTA



Sealtite bolts are available with Loktite Nut #2 (shown), or std. 20 and hex.